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AFV Automation & Communications Work Plan (ACWP)

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ARMORED FAMILY OF VEHICLES (AFV)
CONCEPT EXPLORATION DEFINITION PHASE
AUTOMATION AND COMMUNICATION
WORK PLAN

for
COMMAND, CONTROL, COMMUNICATIONS, COMPUTER
DEVELOPMENT (C4)

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16. SUPPLEMENTARY NOTATION The AFV ACWP focuses on the CED phase of the Army Materiel Acquisition Process for AFV. It is considered an annex to the AFV Automation-Communication Resource Management Plan (ACRMP)			
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19. ABSTRACT (Continue on reverse if necessary and identify by block number) The AFV CED ACWP provides Army plan to achieve a Milestone I decision for AFV command, control, communication, computer and electronics developments. Heretofore, Army guidelines have separated these developments and provided limited integration assistance for the user and engineer. The ACWP presents a methodology to integrate and define a user automated system architecture from the user and engineer point of view. The ACWP is short term and compliments the AFV life cycle ACRMP (DTIC AD Number: AD-190-934). It consolidates DOD, DA, TRADOC, and AMC command and control, communications and computer resource development guidelines.			
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83 APR edition may be used until exhausted.
All other editions are obsolete.

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SCOPE of this Work Plan

THIS PLAN:

- oo Identifies Specific Products for Milestone I
- oo Provides a common road map for C4 developments
- oo Prescribes the information architecture media
- oo Defines Responsibilities
- oo Describes Work Organization
- oo Identifies Technical and Operational Experts
- oo Projects Milestones
- oo Accounts for Organizational Dynamics and Resource Constraints
- oo Strives to Overcome AMC-TRADOC Recognized Computer, Communication, and Electronic (CCE) Development Issues.
- oo Recognizes that CCE Developments are ESSENTIAL to the Army and AFV.
- oo Emphasizes that C4 Developments Must Proceed Concurrently with other AFV Family Plans and Actions, and is not initially constrained by lethality, mobility, or mission role priorities.
- oo Presents a Methodology that is Consistent with Agreed Objectives.
- oo Encapsulates the C4 Mission Area based on Family Multiple Mission Area Concepts and Requirements.

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AFV Automation & Communications Work Plan

WORK PLAN PRODUCT SUMMARY - a Preface

Product, Plans, or Sessions -----	Lead Agency -----	Remarks/ Comments -----
<u>Requirements</u>	TRADOC	Critical for MS I.
O&O Plan C3I Improvements		
Draft ROC		
Functional Description		
<u>Specifications</u>	AMC	
System Operational Concept (SOC)		These build
Executive Summary, C3I Architecture		on the AFV family
Detailed SOC		System Concept and
System Segment Specification (SSS)		Top Level
		Specifications.
<u>Plans</u>		
Preliminary ACRMP	TF, w/ AMC, TRADOC.	Integration
CED AC Work Plan	TF	Management.
ACRWG Charter	TF, AMC	Focus CED.
VCOS Technical Project Management Plan (PMP)	AMC	Formalize support.
B2C2 Technical PMP	AMC	Project management.
<u>Contract</u>		
SOW/RFP for Demonstration Validation	AMC	Plan C4 portion of Family SOW/RFP.
<u>TRADOC Plans</u>	TRADOC	
C2 Master Plan		AFV C3I,
C2 Mission Area Development Plan		incorporation,
Army Battlefield Interface Concept		draft change ready.
<u>Sessions</u>		
ACRWG Sessions	TF	Total Army Support.
ACRWG Management Boards	AMC, TRADOC	For Action.
System Requirements Review (SRR)	TRADOC, AMC	Formal Review of requirements.

Support Integration

Subject Matter includes: materiel acquisition process support actions in the areas of: doctrine, concepts, threat, training, testing, simulation, modelling, logistics, human factors, cost, force design, computer, communications, standardization-interoperability, and policy development or refinement.

ACRMP = AFV Preliminary Automation-Communication Resource Management Plan.

ACRWG = Automation-Communication Resource Working Group.

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1. PURPOSE.

A. Action. This is an AFV Work Group automation and communication (AC) management action plan for concept exploration definition (CED). Its purpose is to identify the work effort and products required for AFV C4-Intelligence (C4I) resource integrated development. This plan is intended to coordinate AC-C4I products for the CED phase Milestone I (MS I) decision for the Armored Family of Vehicles (AFV).

B. Architecture Development. This work plan incorporates the family force level view of concepts, doctrine, requirements, and materiel and strives to encapsulate without repetition, the C4 mission area. Multi-mission area C3I architecture requirements are to be captured by the battalion and below command and control (B2C2) system definition. The family vehicle control and operating system (VCOS) will define system functions for vehicle operations and B2C2 support.

2. SITUATION.

A. AFV Program. Define, develop, and plan to field a family of armored vehicles capable of defeating the threat through the beginning of the 21st century with concurrent reductions in system and force operation and sustainment costs. Major tasks include: close operations concept refinement, provide instruments for executing ALB-F, and the development of appropriate technology, integration, production, and modernization strategies. These tasks affect maneuver, fire support, intelligence and electronic warfare, combat service support, air defense, command and control, mobility, and survivability battlefield operating systems and technologies.

B. Environment. The Chief of Staff of the Army expects an Army supported CED phase culminating in a FY90 Milestone I decision for AFV. The CED phase is characterized by: massive concurrent versus sequential work effort, large program scope, concepts and requirements refinement, evolutionary regulatory guidance, high to low technology programs, resource constraints and allocation conflict, evolutionary planning, changing organizational dynamics, medium to high management structure complexity, complex programmatic, and multiple command priorities. This evolving work plan must consider the above.

C. C4I Impact. The evolving close operations concept, ALB-F, and AFV requirements call for improved C3I capability for the period 1998 and beyond. Computer, communications, and electronic technologies or simply automation-communications (AC) are envisioned to provide support to implement these capabilities.

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D. AC Focus. Emphasis will be on multiple mission area battalion and below command and control (B2C2). ATCCS interoperability is required to achieve a battalion force or lower echelon C3I system. This system will be supported by the advanced vehicle control and operating system (VCOS).

E. Program Synchronization. Basically, AFV C4 initiatives capture concepts, requirements, materiel developments and candidate solutions of a myriad of MACOM on-going projects or programs. AFV lends itself to the advanced planning process by providing a common medium for integrated force development planning.

(1) ATCCS and ATCCS combat-materiel plans provide the AFV C4I baseline. This baseline will evolve to capture the advantages for the AFV equipped force.

(2) Previous Army wide user and technology assessments have determined that functional components of VCOS and B2C2 exist at varying levels of development. The products described in this work plan are intended to provide the common medium to bring individual pieces or components together to form an integrated AFV C4I requirement.

3. MISSION.

Define C4 concept and requirements in sufficient detail to demonstrate ALB-F C3I capability integration into the heavy force for a milestone decision.

4. EXECUTION.

A. Development Scheme.

(1) The AFV Concept Formulation Process (CFP) will result in C3I analytical results applied to the AFV O&O Plan and ROC. The 30 Aug 88, AFV C3I Architecture (B2C2 and VCOS) summaries provided additional information to support these processes.

(2) The Functional Description (FD) will be derived from the O&O and ROC. The CFP will provide supporting information. The FD will define the objective system information architecture in user operational terms in sufficient detail for the milestone decision. The FD serves as a stand alone annex to the ROC.

(3) Preliminary through final CFP and FD results will feed the development of the C4 top level system operational concept (SOC) and system segment specification (SSS). The SOC describes the soldier operations of the vehicle control and operating system. The SSS describes technical machine to machine operations. Traceability to the FD portion of the ROC is required. The SOC and SSS are technical documents produced by the materiel developer. The FD is developed by the combat developer.

(4) Required and desired capabilities, characteristics, and constraints will be analyzed concurrently for determining system functional allocation to the soldier controlled C4 system. The system soldier machine interface will be defined in detail by the FD and SOC.

(5) The FD, SOC, and AC System Specification as they evolve will in turn be analyzed by C3I and vehicle electronics combat-materiel developer experts for impact determination. Corrective action will be initiated, as appropriate.

(6) AFV materiel acquisition process (MAP) command specialists in the areas of: doctrine, concepts, threat, training, testing, engineering, simulation, modelling, logistics, human factors, cost, force design, current systems, fielded systems prior to AFV MS IV, computer, communications, standardization-interoperability, and policy development will conduct appropriate impact analysis. This analysis is to ensure AFV C4 and special area plans and actions are consistent with overall family goals. Corrective action will be initiated, as appropriate.

(7) Automation and Communication Resource Management Plan (ACRMP) will reflect known C4 pure and interfacing specialty (MAP) areas. At MS I the ACRMP should reflect follow on life cycle plans and required actions for C4I system integration.

(8) Although the materiel acquisition process may be depicted sequentially, rapid cyclic or concurrent and parallel execution is expected. Family level C4 requirements historically have evolved slowly and are not initially hampered by lethality, mobility, chassis, or protection level plans or decisions.

(9) This cycle will continue until approximately eight months before Milestone I. At this time the top level system C4 concept, requirements and plans will be captured and documented for defense acquisition board preparatory actions. As life cycle documents they will continue to evolve into the next development phase.

(10) Resources. Time, money, personnel and equipment resources required to support the execution of this plan are expected to originate within Army, MACOM or organic assets as Army AFV priorities dictate during the AFV CED Phase. Resource considerations follow:

(a) Technologies associated with the VCOS system (17 items) are currently under development or improvement within AMC or selected PEO with TRADOC sponsorship. Two critical voids exist: one, ATCOS interface and interconnection with AFV VCOS, and two, definition of functional information flows within a vehicle electronics architecture. These voids exist with or without AFV. The principle difference between AFV VCOS and the Standard Army Vetronics Architecture (SAVA) programs is that AFV requires system definition of functional component interaction with Vetronics prior to implementation.

(b) The Army Command and Control Master Plan calls for forward line of troop through and beyond Corps C3I. Individual vertical mission area requirements and plans exist. Most consider lower echelon C2. The remaining

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challenge is to capture these mission area requirements and then explicitly define the force requirements. This challenge exists with or without AFV.

(11) Policy. C3I requirements must be clearly defined or explicitly referenced in AFV requirements documents and plans. The AFV advanced vehicle electronic architecture definition must support and interoperate with the lower echelon command and control system.

(12) Personnel Qualifications. As a minimum, AFV command points of contact must be familiar with life cycle management in accordance with AMCR (DARCOM) 70-16, AR 70-1, AR 71-9 and DOD-STD-2167/2167A. Long term qualifications include access to Zenith 248 (or compatible) hardware, printer, Defense Data Network, Lotus/dBase software, data facsimile and to be determined project management and word processing software packages.

(13) Total Army Support. Defined in the Automation and Communication Resource Working Group Charter, approved 31 Aug 87, revised Aug 88.

(14) Work Plan Limitations and Future Actions. This plan provides a summary of AC related documentation required for a MSI decision. Anticipate refinements to this plan.

B. Responsibilities.

(1) TRADOC. Define the C3I-Vehicle information architecture. Ensure that this and other requirements and plans adequately address C3I in an integrated manner. Develop C4 functional description as a life cycle document. Synchronize B2C2-VCOS direct and supporting developments.

(2) AMC. Develop top level specifications and ensure communications, computers, and electronics are integrated into all materiel acquisition process initiatives. Synchronize B2C2-VCOS direct and supporting developments. Conduct a preliminary System Requirements Review prior to MS 1.

(3) ASARD. Maintain PEO liaison. Assist in tailoring Army Technology Base to support C4I, artificial intelligence, and robotics initiatives.

(4) HQ DA. Provide staff specialty area quality assurance check for AFV C4I developments. Notify Task Force of policy, plans, or other developments which have direct or indirect affect on the AFV C4 program.

(5) ODISC4. Monitor AFV information architecture plans and developments to ensure consistency with current Army plans.

(6) PEO. Support and monitor C3I-C4I and electronic developments to enable ATCCS-vehicle interoperability and evolution of requirements for the 1998 and beyond time period.

(7) Major Subordinate Commands. Identify and manage mission area expertise in support of the AFV program.

C. Work Organization.

(1) Development Management Agencies. Establish policy and coordinate plans to ensure C4 developments are consistent with overall heavy force plans.

(a) HQ DA - AFV Task Force, DAMO-AFV-C.

(b) Combat Developments - TRADOC AFV Proponency Office (AFV-PO), ATZL-CAB.

(c) Materiel Developments - AMC AFV Integration Group, AMCSP-AFV.

(d) Logistics - LOGCEN, ATCL-CA.

(e) Trainer - Combined Arms Center (CATA), ATZL-TAS.

(f) Tester - TECOM (technical) and OTEA (operational).

(2) Lead Integrators. Have multi-command execution and coordination authority to define an integrated architecture. They recommend work breakdown structure changes and coordinates with AMC, TRADOC, PEO/PM operational and technical experts for support action. They also serve as lead major subordinate commands technical managers in their designated roles.

- C4 Architecture -	- Lead Combat Developer-	-Lead Materiel Developer-
(a) B2C2 C3I Architecture	CACDA(C3I)	CECOM
(b) VCOS Architecture	CACDA(MID)	TACOM

(3) Milestone 1 AC-C4 life cycle Product Developers. Product and product developer designation follow. Coordinates with lead integrators and operational- technical experts for product life cycle development.

(a) Functional Description (FD) - CACDA.

(b) [Technical] System Operational Concept (SOC) - TACOM.

(c) System Segment Specification (SSS) - CECOM.

(d) Automation (computer) and Communication Resource Management Plan (ACRMP) - AFVTF.

(4) AC-C4 Operational and Technical Experts. Serve as work breakdown structure (WBS, or MAP topic area) experts and support product development and integration. Lead combat and materiel developers with associated support agencies will assist the lead integrators and product developers. Maintain coordination with associated PM offices. The detailed WBS is located at appendix C, WBS for Concept Exploration Definition. A WBS summary follows.

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Work Breakdown Structure Summary

WBS AREA	Lead CD Expert	Lead MD Expert	PEO-PM Lead
Communications, External	CACDA	CECOM	PEO COMM
Intercom- Internal Commo	CACDA	CECOM	PEO COMM
Active Vehicle Defense	CACDA	TACOM	PEO CCV
Fire and Weapon Control	CACDA	ARDEC	PEO ARM
Vehicle CSS	LOGCEN	CECOM	PM TMDE
Position-Navigation	CACDA	ETL	PEO COMM
Embedded Training	CAC	PM TRADE	PM TRADE
Environment Control	CACDA	CRDFC	PEO CCV
VCOS Controller	CACDA	TACOM	TBD
Bus Architecture	CACDA	TACOM	TBD
Power Distribution	CACDA	TACOM	PEO CCV
Tgt Acq & Recognition	CACDA	CECOM	PEO ACIS
ATCCS-B2C2	CACDA	CECOM	PEO CCS, IEW
Fighting Stations	CACDA	TACOM	PEO CCV, CCS, FS, FAAD
Automotive Management	CACDA	TACOM	PEO CCV
External Interface Port	CACDA	CECOM	PEO COMM
Vehicle-C3I Mission Spt	CACDA	CECOM	PEO CCS, IEW

Key: CD, Combat Developer
 MD, Materiel Developer
 PEO, Program Executive Officer
 PM, Program Manager

(5) Army Support. Defined by the AFV Automation and Communication Resource Working Group (ACRWG) and its' approved charter. The primary function of the ACRWG is to support management, lead integrators, combat, materiel, and product developers in mission execution. The ACRWG secondary role is to provide the forum for collective review and analysis of plans and products. The basic ACRWG organization parallels that of the stated lead integrators, product developers, and the traditional Army C3I or computer, communication, and electronics (CCE) development communities. This establishes central product and integration responsibility but allows decentralized or distributed workloads to permeate throughout the work group organization. The ACRWG organization and product support summary follows at sub-paragraphs (a) through (g). Sitting chairs are responsible for board organization refinements.

(a) Executive Board, Sitting Chair: AFVTF, Deputy Co-Chair; AMC and TRADOC. Guides: ACRMP and ACWP developments. Supports management agencies in developing policy and goals. Assists AMC to prepare for the preliminary system requirements review.

(b) Requirements Board, Sitting Chair: CACDA, Direct product support: ACRMP Requirements Summary, FD as an integrated information architecture. Assists in refining the O&O Plan and ROC and in synchronizing the analysis of requirements.

(c) System Engineering and Plans (SEP) Board, Sitting Chair: CECOM; Deputy TACOM. Direct product support: Technical SOC, SSS, implementation plans for VCOS-B2C2, and ACRMP development management responsibilities and management, and an Executive Summary for the SOC. Assists in refining both the O&O Plan and ROC and supports analysis synchronization of same.

(d) Life Cycle Support (LCS) and Plans Board, Sitting Chair: CECOM. Direct product support: ACRMP acquisition strategy and support, and ACWP. Assists in computer, communication, and electronic (CCE) system ILS and produceability-supportability analysis, Demonstration-Validation Phase scope of work and requests for proposal development, and AC-C4 life cycle cost estimate refinements. Ensures consistency with AFV logistics program management documents (AS, ILSP).

(e) Test Planning Board, Sitting Chair: TACOM; Deputy CECOM. Direct product support: ACRMP test planning. Assists in AFV TEMP CCE system test plans and refines these system level test goals for precise subsystem (B2C2 and VCOS) hardware-software objectives.

(f) Configuration Management and Quality Assurance (CM & QA) Board, Sitting Chair: TACOM. Maintains central technical and reference library for AC-C4 developments. Supports Army and AFV study contractor requests for information. Reviews products for consistency and requirements traceability. Develops quality assurance and evaluation checklists for the AFV AC program. Monitors C4 developments to ensure management agencies, lead integrators, product developers, and board sitting chairs maintain the same information and planning baseline.

(g) DA Advisory Panel. Monitors AFV developments to ensure consistency with Army policy. Panel members are individually responsible for advising the Director on AC-C4 matters which may affect the AFV program.

D. Product Priorities. Listed in priority sequence for Concept Exploration Definition.

(1) O&O Plan and ROC, for Concept Formulation Process guided C4I refinements.

(2) Functional Description, for functional architecture definition.

(3) Technical System Operational Concept, for system operations.

(4) System (Segment) Specification, for top level materiel definition.

(5) Preliminary Automation [computer] and Communication Resource Management Plan (ACRMP), for management.

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E. Milestones.

- (1) Preliminary System Requirements Review, at MS 1 minus 9.0 months.
- (2) MS 1 Products, at MS 1 minus 8.5 months.
- (3) MS 1 Support Products, at MS 1 minus 8 months.
- (4) Commence Monthly Status Reporting, Nov 88.
- (5) Full session of the ACRWG, 1QTR FY 89.
- (6) IPR or work sessions, as mission requires.

5. COORDINATING INSTRUCTIONS.

A. Support Plans. The preliminary AFV ACRMP is required for MS 1. It covers the entire AFV life cycle. This work plan supplements the ACRMP as it provides CED focus. Both documents will evolve throughout the CED phase; however, work plan improvements will occur at a faster rate. It is envisioned the command originated work plans will be developed to specifically support this plan. Affected commands may anticipate this action.

B. Coordination.

(1) Lead management, integrators, product developers, and ACRWG sitting chairs must be on an equivalent information baseline via simultaneous release of appropriate information.

(2) Lead integrators and product developers will maintain close and continuous exchange of emerging results. Product developers and technical-operational experts will do the same.

(3) All AFV participants are required to coordinate AFV matters with their traditional non-TRADOC or non-AMC counterparts, e.g. Engineering Topographic Lab coordinates with the Defense Mapping Agency, or LOGCEN with LEA.

C. Project Status Reporting. A project control mechanism is necessary to coordinate and regulate resources, measure progress and identify program and work plan adjustments based on experience and changes to the operating environment. The reporting mechanism must be usable by the Task Force, TRADOC, AMC and executing command leadership. Product developers and ACRWG sitting chairs are required to report. The monthly reports will cover:

- (1) Schedule - report either on, ahead, or behind schedule.
- (2) Achievement - report completed events.
- (3) Plans - sixty day projection.

(4) Exception - Report events that have been or probably will be missed, real or potential problem areas and exceptional events that are positive in nature.

(5) Special Reports or Briefings - as required.

(6) Issues and Concerns - as required, to document items for resolution. Format of this required report is provided in the ACRMP, Appendix C.

(7) Action Officer Changes - to update personnel responsibilities and expedite coordination.

D. Appendix Descriptions. Appendices provide additional information for middle management concerning the previous paragraphs.

(1) Objectives. Milestone I objectives and tasks.

(2) Milestones. Expanded summary.

(3) Work Breakdown Structure (WBS). Refined structure.

(4) Milestone I Products. Contains summaries of the Functional Description, Technical System Operational Concept, System Segment Specification, and Automation-Communication Resource Management Plan.

(5) Milestone I Support Products. Describes C4 support products and role of the C4 and non-C4 developers.

(6) Total Army Support Summary. Lists Automation-Communication Resource Work Group (ACRWG) membership and other support organizations or agencies.

(7) References. Guidance and historical background.

(8) Acronyms and Abbreviations.

(9) Organization Dynamics. Graphically depicts organization and process flows.

E. ACWP Changes. Specific recommendations to improve this document are encouraged.

6. COMMAND POINTS OF CONTACT.

A. Message, Mail, and Defense Data Network addresses of the AC-C4 development players are to be maintained at Appendix C, of the ACRMP. Listed commands are responsible for accuracy.

B. Command representatives are to be listed in the ACRWG Charter by name.

ACWP APPENDICES

APPENDIX A
C4I DEVELOPMENT OBJECTIVES

This appendix has four parts:

- I. Goal
- II. Objective Summary, by title listing.
- III. Definitions, used in this appendix.
- IV. Objectives, with tasks, assumptions, action and review agencies

PART I GOAL

Integrate support for the AFV automation and communication (AC) life cycle and decision processes through timely, accurate, and aggressive action.

PART II OBJECTIVE SUMMARY

The following table describes the objectives contained in part three.

Objective	Title
OBJECTIVE 1	- Definition.
OBJECTIVE 2	- Commonality and Doctrine.
OBJECTIVE 3	- Disciplined Evolution.
OBJECTIVE 4	- Information Architecture Definition.
OBJECTIVE 5	- Development and Acquisition Management.
OBJECTIVE 6	- Engineering Principles.
OBJECTIVE 7	- Standardization.
OBJECTIVE 8	- Technology Assessments.
OBJECTIVE 9	- Quality Test Methods.
OBJECTIVE 10	- Training.
OBJECTIVE 11	- Integrated Logistics and Vehicle Diagnostics-Prognostics.
OBJECTIVE 12	- Fielding and Post Deployment Support.
OBJECTIVE 13	- Interoperability.
OBJECTIVE 14	- Human Factors Engineering.
OBJECTIVE 15	- Security and Threat Analysis.
OBJECTIVE 16	- Analysis.

Appendix A
C3I Development Objectives

II. DEFINITIONS.

The terms below are used in part three.

Objective: The intermediate goal to support overall family mission and goal.

Task: Work effort required to accomplish the objective. Noting that all support tasks and task intersections are not listed.

Assumption: Factors which may influence the task.

Product: First cut through MS 1 deliverable. The term deliverable and product are equivalent. Most products will continue to evolve beyond MS 1. Product designation indicates where the C4 information is to be documented.

Action: Command responsible for execution, consistent with the intent of the identified responsibilities and work organization. Major subordinate command designation indicates C4 association. Note that when a MACOM has designated action it is a family oriented task that directly affects C4 work effort; however, non-C4 developers typically are executing and action may be in progress.

Review: Command or agency responsible for quality assurance review.

III OBJECTIVES.

The following objectives support this goal and apply to the AC-C4 developments. (Reference the approved AFV ACRWG Charter.)

C4 OBJECTIVE 1 - Definition.

Ensure definition of of executable automation and communication requirements which enable achievement of the required tactical and operational time lines in all C3I aspects of the future battlefield as related to AFV.

TASK 1.1: Synchronize ALB-F C3I with Operational Concept.

ASSUMPTION: CAC(ALB-F) working with AFVTF, on going effort.

PRODUCT: AFV Operational Concept (how to fight).

ACTION: TRADOC

REVIEW: AFVTF, AMC.

TASK 1.2: Improve C3I Requirements Definition

ASSUMPTION: Joint effort by AFV-P0, TRADOC HQ and AFVTF

PRODUCT: O&O Plan revisions, ROC.

ACTION: TRADOC

REVIEW: AMC, AFVTF

Appendix A
C3I Development Objectives

TASK 1.3: Develop policy and guidance for AFV C4I Family.
ASSUMPTION: TRADOC 71-2, AMCR 70-16, and AR 70-1 changes in progress.
PRODUCT: AFV ACWP, AFV ACRMP.
ACTION: AFVTF, AMC AFV Integration Group, TRADOC AFV-P0.
REVIEW: MACOM-MS.

C4 OBJECTIVE 2 - Commonality and Doctrine.

Maximize commonality and modularity across the AFV fleet. Support evolving ALB-Future doctrine and principles (task 1.1).

TASK 2.1: Concentrate on consistent family common C4I user and technical definitions that will support AFV mission role subsystems. C4 products must be constructed in a top down - modular manner.
PRODUCTS: Functional Description (FD), Technical System Operational Concept (SOC), System Segment Specification (SSS).
ACTION: SOC- TACOM, SSS - CECOM, FD- CACDA.
REVIEW: CACDA, CECOM, TACOM, ACRWG.

C4 OBJECTIVE 3 - Disciplined Evolution.

Assist the Director, AFVTF initiating early tasks and activities that are prerequisites to the definition, development, test, and fielding functions of AFV.

TASK 3.1: Develop via top down refinement with intermediate review or approval points. Plan and synchronize multi-command actions.
ASSUMPTION: TRADOC has lead in C3I development synchronization, further action required for milestone and action correlation.
PRODUCT: ACWP, VCOS PMP, B2C2 PMP.
ACTION: ACWP - AFVTF, AMC & TRADOC HQ. VCOS PMP- TACOM. B2C2 PMP- CECOM.
REVIEW: HQ DA through AFVTF.

TASK 3.2: Project Reporting
PRODUCT: Monthly Status Reports
ACTION: As designated.
REVIEW: AFVTF, AFV-P0, AFV Integration Group

AFV Automation & Communications Work Plan

Appendix A
C3I Development Objectives

C4 OBJECTIVE 4 - Information Architecture Definition.

Assist the Director in the development of the AFV C4I and vehicle information architecture. Support, plan, recommend, actions for vehicle electronic integration for vehicle operations and C4I subsystems.

TASK 4.1: Define C4I Information Architecture for MS 1. VCOS must support B2C2.

ASSUMPTION: AFVTF will provide coordinated first cut.

PRODUCT: Functional Description (FD).

ACTION: CACDA

REVIEW: CECOM, TACOM, Automation-Communication Resource Working Group (ACRWG).

C4 OBJECTIVE 5 - Development and Acquisition Management.

Improve the acquisition management of automation and communication resources for AFV from subsystem through family levels. Ensure the horizontal and vertical integration of AFV technical and management plans and facilitate preparation, review, and approval of the system's ACRMP and subordinate plans.

TASK 5.1: Develop C4 Life Cycle Plan that is synchronized with the Materiel Acquisition Process.

PRODUCT: ACRMP

ACTION: AFVTF

REVIEW: ACRWG, AMC, TRADOC, DA Staff

TASK 5.2: Develop C4I acquisition strategies in conjunction with AFV strategies.

ASSUMPTION: AMC, TRADOC, AFVTF working family acquisition strategies.

PRODUCT: ACRMP

ACTION: CECOM, CACDA, TACOM, AFVTF, LOGCEN

REVIEW: AFVTF, AMC, TRADOC, ACRWG

C4 OBJECTIVE 6 - Engineering Principles.

Increase the visibility of automation and communication resources in the overall life cycle of the family and adhere to sound engineering principles. Decrease the proliferation of unwarranted and/or unique automation and communication resources in the Army inventory.

TASK 6.1: Develop Vehicle Control and Operating System (VCOS) from the vehicle-soldier perspective show soldier-B2C2 interface.

ASSUMPTION: System engineering part of C4 Product development.

PRODUCTS: FD, SOC, SSS

ACTION: As stated.

REVIEW: AFVTF, AMC, TRADOC, ACRWG.

Appendix A
C3I Development Objectives

TASK 6.2: Develop the Battalion and Below Command and Control (B2C2) C3I top down from the battalion level. Show VCOS interface at each level of command.
PRODUCT: FD, SOC, SSS
ACTION: As stated
REVIEW: AFVTF, AMC, TRADOC, ACRWG.

C4 OBJECTIVE 7 - Standardization.

Promote the use of proven hardware, approved higher order languages, compilers, and other software tools in or for the system.

TASK 7.1: Strive to develop classes of (sub) systems or components which are of similar function and materiel characteristics, e.g. fighting station, fire control, computer chips.
PRODUCT: SOC, SSS (and BTA, COEA)
ACTION: CECOM, TACOM
REVIEW: ACRWG

TASK 7.2: Support and refine ATCCS standards for AFV C4 initiatives. Identify standards appraised as burdensome to battalion and below levels.
PRODUCT: ACRMP
ACTION: AMC, CECOM
REVIEW: AMC, TRADOC, AFVTF, ACRWG.

C4 OBJECTIVE 8 - Technology Assessments.

Maintain the Technology Assessment to include research, development, technology insertion, and PEO/PM managed systems. Capture operational and technical demonstration data of candidate components and subsystems. Increase the standardization of automation and communication resources by making maximum use of standard product line resources. Strive for risk reduction.

TASK 8.1: Maintain TOD Technology Assessment throughout CED based on common work breakdown structure (WBS).
PRODUCT: TOD, BTA
ACTION: AMC, with TRADOC support.
REVIEW: AFVTF, ACRWG.

TASK 8.2: Integrate critical technologies milestones into AFV milestones. Develop common milestone information (allow for some deviation) for incorporation into AFV AC-C4 milestones.
PRODUCT: ACRMP and TOD-BTA
ACTION: ACRMP - as stated, TOD-BTA -AMC w/ TRADOC support.
REVIEW: ACRWG

AFV Automation & Communications Work Plan

Appendix A
C3I Development Objectives

TASK 8.2.1: Integrate key technologies milestones into AFV milestones. Develop common milestone information (allow for some deviation) for incorporation into AFV C4 milestones.
PRODUCT: ACRMP and TOD-BTA
ACTION: ACRMP - as stated, TOD-BTA -AMC w/ TRADOC support.
REVIEW: ACRWG

TASK 8.2.2: Integrate applicable and candidate technologies milestones into AFV milestones, separately. Develop common milestone information (allow for some deviation) for incorporation into AFV C4 milestones.
PRODUCT: TOD, BTA
ACTION: TOD, BTA - AMC w/ TRADOC support.
REVIEW: AFVTF, AMC, TRADOC, ACRWG

C4 OBJECTIVE 9 - Quality Test Methods.

Eliminate unnecessary redundancy in testing. Ensure procedures or plans are developed for specification, hardware, (computer and communication), and software testing.

TASK 9.1: Develop refined test methodologies to cover the the unique AC needs. Design test guidelines to find system failure.
ASSUMPTION: Definition of system level AC testing in TEMP. High level of coordination with the TIWG required.
PRODUCT: ACRMP
ACTION: TACOM, CECOM
REVIEW: TACOM, CACDA, ACRWG, TIWG

C4 OBJECTIVE 10 - Training.

Facilitate trainer/materiel developer coordination in the development of appropriate training programs, e.g System Training Plan (STRAP).

TASK 10.1: Develop AFV Training Plans
ASSUMPTION: The AFV Training Development on going.
PRODUCT: STRAP
ACTION: AMC, TRADOC
REVIEW: AFVTF, AMC, TRADOC, ACRWG

TASK 10.2: STRAP developers and support agencies define AFV tasks and desired functions for embedded training.
PRODUCT: FD
ACTION: CAC(CATA), PM TRADE
REVIEW: CACDA, CECOM, TACOM, ACRWG.

Appendix A
C3I Development Objectives

C4 OBJECTIVE 11 - Integrated Logistics and Vehicle Diagnostics-Prognostics

Facilitate the integration of Built in Test (BIT) and minimized Built in Test Equipment (BITE) into the planned AFV diagnostic equipment capabilities. Plan for limited required Test Program Sets or Test Maintenance Diagnostics Equipment (TMDE). Strive for commonality of design and design of testability.

TASK 11.1: As family level logistics concepts evolve, apply to C4 as applicable. Refine concepts to ensure sufficient detail for computer, communication, and electronic development and support.

ASSUMPTION: Logistics developer will provide necessary family level concepts.

PRODUCT: ACRMP.

ACTION: LOGCEN.

REVIEW: CACDA, CECOM, TACOM, ACRWG.

TASK 11.2: Define operational level of required diagnostics, develop prognostic evaluation rules.

PRODUCT: FD.

ACTION: LOGCEN.

REVIEW: CACDA, CECOM, TACOM, ACRWG.

TASK 11.3: Define Test Program Set needs and development plans

PRODUCT: ACRMP, ILSP

ACTION: AMC, TRADOC

REVIEW: AMC, TRADOC, AFVTF, ACRWG

C4 OBJECTIVE 12 - Fielding and Post Deployment Support.

Assure the timely fielding of the system to the using command and an orderly transition to the post-deployment support activities.

TASK 12.1: Ensure Life Cycle Hardware-Software Support Center support objectives and needs are defined.

ASSUMPTION: Support concept calls for a central support center with control of hardware and software developments (P3I and maintenance).

PRODUCT: ACRMP

ACTION: CECOM, TACOM

REVIEW: AMC, TRADOC, AFVTF, ACRWG.

TASK 12.2: Develop the C4 spectrum support requirements, feed results to the Transition Plan and Materiel Fielding Plan developers.

PRODUCT: ACRMP

ACTION: CECOM

REVIEW: TACOM, TRADOC, ACRWG

AFV Automation & Communications Work Plan

Appendix A
C3I Development Objectives

TASK 12.3: Estimate Software Development Cost via an accepted methodology and metric.

ASSUMPTION: Family level cost development is on going. This effort defines software cost. Some cost data may be required for the ACRMP.

PRODUCT: Software Cost annex to Baseline Cost Estimate (BCE).

ACTION: CECOM

REVIEW: TACOM, AMC, AFVTF, ACRWG.

TASK 12.4: Estimate software and hardware supportability cost data.

ASSUMPTION: same as task 12.3.

PRODUCT: Cost annex or input to BCE.

ACTION: CECOM, TACOM

REVIEW: AMC, TRADOC, AFVTF, ACRWG.

C4 OBJECTIVE 13 - Interoperability.

Ensure interoperability and compatibility between AFV and other automated and communication systems required under the Army Tactical Command and Control System. Integrate command, control, communications systems in support of AFV (e.g. AFV and LHX).

TASK 13.1: Ensure B2C2 system and ATCCS interoperability.

PRODUCT: FD, SOC, SSS

ACTION: As stated

REVIEW: AMC, TRADOC, AFVTF

TASK 13.2: Develop and promote the interoperability or interface requirements for VCOS with its resident B2C2 subsystem.

PRODUCT:

ACTION:

REVIEW:

TASK 13.3: Develop the interoperability or interface requirements and specifications between VCOS functional components.

PRODUCT:

ACTION:

REVIEW:

C4 OBJECTIVE 14 - Human Factors Engineering.

Strive for Common Soldier/Machine Interfaces (MANPRINT Human Factors Engineering (HFE)).

Appendix A
C3I Development Objectives

TASK 14.1: Capture soldier machine interface [fighting station] standards and quantitative data in conjunction with requirements development and architecture definition.

ASSUMPTION: Maintain an interactive or cyclic process until complete. Maintain HFE data as part of the MANPRINT class of MS I products. Apply results to C4.

PRODUCT: ACRMP, FD, SOC

ACTION: HEL, PM TRADE

REVIEW: CECOM, TACOM, CACDA

TASK 14.2: Achieve optimal cost and operationally effective integration support for the soldier. Reduce individual component operation burden with automatic support.

PRODUCT:

ACTION:

REVIEW:

C4 OBJECTIVE 15 - Security and Threat Analysis.

Explicitly address operational and internal-external communication security needs. Consider threat to communications, computer, and electronic (CCE) support systems.

TASK 15.1: Conduct threat impact analysis during all phases of development.

ASSUMPTION: Threat defined in the AFV Q&O, draft ROC, and STAR.

PRODUCT:

ACTION:

REVIEW:

TASK 15.2: Conduct operational security (OPSEC) impact analysis during all phases of development.

ASSUMPTION: Goal is to reduce soldier OPSEC burdens.

PRODUCT:

ACTION:

REVIEW:

TASK 15.3: Conduct communications security (COMSEC) impact analysis during all phases of development.

ASSUMPTION: Goal is to reduce soldier COMSEC burdens via cost effective automatic support.

PRODUCT:

ACTION:

REVIEW:

AFV Automation & Communications Work Plan

Appendix A
C3I Development Objectives

C4 OBJECTIVE 16 - Analysis.

Identify operational advantages for selected C4 concept and requirements.
Strive to quantify time or other agreed to metric to assist in COE and C3 counter measure supportability evaluations.

TASK 16.1: Determine operational time saving by comparing manual versus automatic support timing.

ASSUMPTION: This analysis is applicable to the TOA and COEA.

PRODUCT: Annex to the Functional Description or System Operational Concept.

ACTION: ACRWG Life Cycle Support Board.

REVIEW: AFVTF, AMC, TRADOC, ACRWG

TASK 16.2: Identify the appropriate support tools (computer hardware and software environment) to simulate the dynamic and static executions of the C3I and Vehicle Architecture definitions.

ASSUMPTION: Technical support environments are available, e.g. ADA development stations, structured design tools, ETL design support tools, or INDEF (Air Force). Operational simulations are also available, e.g. SIMNET, Vetrionics demonstrator.

PRODUCT: Annex to the System Operation Concept.

ACTION: ACRWG Life Cycle Support Board.

REVIEW: AFVTF, AMC, TRADOC, ACRWG.

TASK 16.3: Identify the availability and resource requirements for a force on force model that incorporates automatic C2 support as an operational characteristic.

ASSUMPTION: Traditional force on force models (e.g. VIC) may have limited or no capability to incorporate C2 or C3I. Models with C3I capability exist.

PRODUCT: COEA

ACTION: TRADOC

REVIEW: AFVTF, AMC, TRADOC, ACRWG.

(Objectives, task refinements, and task milestone updates are expected.)

APPENDIX B
MILESTONE SUMMARY

	<----- FY 89 -----><----- FY 90 ----->										
	1st	2nd	3rd	4th	1st	2nd	3rd	4th			
	Qtr							Qtr			
Calendar Month....	O	N	D	J	F	M	A	M	J	J	A
Topic											
06 C3I Conference.	^										
ACRWG Meeting		^									
IPR's ...			^	^	^						
Preliminary SRR ..							^				
FD		^		^		^					
SOC			^		^	^					
SSS				^		^					
ACRMP		^		^		^					
VCOS PMP	^		^		^						
B2C2 PMP	^		^		^						
Products Due							^				
ASARC/DAB Prep ...							=====				
Prod Revisions ...								^			
MS 1										^	
Calendar Month ...	O	N	D	J	F	M	A	M	J	J	A

Development Phases	First Draft	Second Draft	Third Draft		MS Product				Product Evolution		

Key:

ACRWG, Automation-Communication Resource Working Group
 ACRMP, Automation-Communication Resource Management Plan
 VCOS, Vehicle Control and Operating System
 FD, Functional Description
 SSS, System Segment Specification

B2C2, Battalion and Below Command and Control
 PMP, Project Management Plan (Technical)
 SRR, System Requirements Review
 SOC, Technical Operational Concept

Schedule Name: AD-04 WORK SUMMARY

Project Manager: MAJ ELCINSTAD, AV 907-1465/1416

As of date: 27-Aug-88 11:55am Schedule File: D:\ATLDATA\WFSBLMM

AD-04 WORK SUMMARY FOR MILESTONE 1

		88					89					90				
		Jul	Sep	Nov	Jan	Mar	May	Jul	Sep	Nov	Jan	Mar	May	Jun		
Status		1	1	1	3	1	1	3	1	1	2	1	1	1		
041 Architecture Summary	D	M	.	.	.	.	.	.	.	.	.	.	.	.
15 Level 100 Conference		.	.	.	.	.	.	.	.	.	.	.	.	.
Concept Formulation Package		-----														
IEEE		.	=====							.						
030 Plan Update		+++++														
000 Development		.	.	.	=====										.	
FINAL INTEGRATION WINDOW	C	.	.	.	.	.	.	.	.	.	=====
W9 1, W901, All Revisions Iss		.	.	.	.	.	.	.	.	.	.	.	.	.
W9 1	CD	.	.	.	.	.	.	.	.	.	.	.	.	.
ACFWB Session #1, All Versions		.	.	.	.	.	.	.	.	.	.	.	.	.
: ACFWB Session #2, TBC		.	.	.	.	.	.	.	.	.	.	.	.	.
AUTO W COMM DEVELOPMENTS	D	-----														
: FUNCTIONAL DESCRIPTION FD		.	.	.	.	.	.	.	.	.	.	.	.	.
: FD, 1st draft		.	.	.	.	.	.	.	.	.	.	.	.	.
: FD, 2nd draft		.	.	.	.	.	.	.	.	.	.	.	.	.
: FD, 3rd draft		.	.	.	.	.	.	.	.	.	.	.	.	.
: ACRMP		.	.	.	.	.	.	.	.	.	.	.	.	.
: ACRMP, Change 1		.	.	.	.	.	.	.	.	.	.	.	.	.
: ACRMP, Change 2		.	.	.	.	.	.	.	.	.	.	.	.	.
: ACRMP, Change 3		.	.	.	.	.	.	.	.	.	.	.	.	.
: ACRMP, Change 4		.	.	.	.	.	.	.	.	.	.	.	.	.
: TECH SYS OF CINDERT (SDD)		.	.	.	.	.	.	.	.	.	.	.	.	.
: SDD, 1st draft		.	.	.	.	.	.	.	.	.	.	.	.	.
: SDD, 2nd Draft		.	.	.	.	.	.	.	.	.	.	.	.	.
: SDD, 3rd draft		.	.	.	.	.	.	.	.	.	.	.	.	.
: SYS SEGMENT BRSD (SSB)	D	.	.	.	.	.	.	.	.	.	.	.	.	.
: SSB, 1st draft		.	.	.	.	.	.	.	.	.	.	.	.	.
: SSB, 2nd draft		.	.	.	.	.	.	.	.	.	.	.	.	.
REPORT ANALYSIS & ACTION	D	-----														
: Integration Closeout		.	.	.	.	.	.	.	.	.	.	.	.	.
: Prelim Sys Req Review (ERR)	D	.	.	.	.	.	.	.	.	.	.	.	.	.
: ERR Readiness Update	D	.	.	.	.	.	.	.	.	.	.	.	.	.
: Software-Hardware Cost	D	.	.	.	.	.	.	.	.	.	.	.	.	.
: Compo.Comp. Elect Test Plan	D	.	.	.	.	.	.	.	.	.	.	.	.	.
: Integrated Logistics	D	.	.	.	.	.	.	.	.	.	.	.	.	.
: Inprocess Review, Walkthrough	D	.	.	.	.	.	.	.	.	.	.	.	.	.
: IPR, Exec Board, #1		.	.	.	.	.	.	.	.	.	.	.	.	.
: IPR, Exec Board, #2		.	.	.	.	.	.	.	.	.	.	.	.	.
: IPR, Exec Board, #3		.	.	.	.	.	.	.	.	.	.	.	.	.

D Done === Task ~ Slack time (====), or
 C Critical +++ Started task Resource delay (=====
 R Resource conflict M Milestone : Conflict
 p Partial dependency
 Scale: Each character equals 2 weeks

Schedule Name: AD-04 WORK SUMMARY

Project Manager: MAJ EUC/STAD or MAJ WOODSTER, AV 927-1466

As of date: 27-Aug-88 3:02pm

AD-04 WORK SUMMARY FOR MILESTONE 1

Task	Start	
C4I Architecture Summary	1-Aug-88	8:00am
C6 Level C3I Conference	6-Oct-88	8:00am
Concept Formulation Package	30-Jun-88	8:00am
CCFA	15-Sep-88	8:00am
C&D Plan Update	7-Sep-88	7:00pm
POC Development	5-Sep-88	7:00pm
FINAL INTEGRATION WINDOW	1-Dec-89	11:00am
MS 1, POC, All Revisions Due	15-Mar-89	11:00am
MS 1	15-Jun-89	11:00am
ACRWS Session #1, All members	15-Nov-88	11:00am
: ACRWS Session #2, TEC	15-Aug-88	11:00am
ACRWS COMM DEVELOPMENTS	1-Aug-88	8:00am
: FUNCTIONAL DESCRIPTION #1	1-Dec-88	11:00am
: FD, 1st draft	15-Dec-88	8:00am
: FD, 2nd draft	15-Mar-89	8:00am
: FD, 3rd draft	15-Jun-89	8:00am
: ACRWS	1-Dec-88	8:00am
: ACRWS, Change 1	1-Nov-88	11:00am
: ACRWS, Change 2	1-Apr-89	8:00am
: ACRWS, Change 3	1-Oct-89	8:00am
: TECH SPEC OF CONCEPT #1	1-Dec-88	11:00am
: SOC, 1st draft	15-Jan-89	8:00am
: SOC, 2nd draft	15-May-89	8:00am
: SOC, 3rd draft	17-Jul-89	8:00am
: SYS SEGMENT SPEC (SSS)	1-Dec-88	11:00am
: SSS, 1st draft	1-Mar-89	11:00am
: SSS, 2nd draft	1-Aug-89	11:00am
SUPPORT ANALYSIS & ACTION	1-Aug-88	8:00am
: Integration Closeout	1-Nov-89	8:00am
: Prelim Evt Req Review (SRR)	7-Aug-89	11:00am
: SRR Readiness Update	5-Jul-89	11:00am
: Software-Hardware Cost	15-Jan-89	8:00am
: Commo, Comp, Elect Test Plan	15-Jan-89	8:00am
: Integrated Logistics	15-Jan-89	8:00am
Therocess Review, Walkthrough	15-Nov-88	11:00am
: IPR, Exec Board, #1	15-Jan-89	8:00am
: IPR, Exec Board, #2	15-May-89	8:00am
: IPR, Exec Board, #3	1-Aug-89	11:00am

APPENDIX C
WORK BREAKDOWN STRUCTURE (WBS) for CONCEPT EXPLORATION DEFINITION

This appendix has three parts:

I. LEAD INTEGRATOR REFINEMENTS. Defines the major subordinate command (MSC) plan point of contact.

II. PRODUCT REFINEMENT. Describes in more detail the products required for MS I. The O&O Plan, ROC, and CFP are listed to ensure these documents reflect C4 needs.

III. WORK BREAKDOWN STRUCTURE. Designates operational and technical experts. This WBS is primarily a functional decomposition of the AFV vehicle architecture. It identifies Army known expertise as associated to the WBS topic area or subject matter.

PART I. LEAD INTEGRATOR REFINEMENT

<u>Special Lead Integrators</u>	<u>Combat Developer</u>	<u>Materiel Developer</u>	<u>PEO-PM Lead</u>
Lower Echelon C3I (B2C2), Lead	CACDA(C3I)	CECOM(ASCO)	PEO CCS(OPS)
Vehicle Ctrl & Opns (VCOS) Lead	CACDA(MID)	TACOM(ELEC)	PEO CCV(OPS)

Appendix C
Work Breakdown Structure (WBS) for Concept Exploration Definition

PART II. PRODUCT REFINEMENT

This section describes the MS I product contents, associated accuracy required for MS I, lists the product integrator as a whole or section, and ACRWG management board available support. The number of drafts indicate the number of formal reviews required prior to MS I. This process allows for disciplined evolution and impact analysis prior to final milestone product delivery.

<u>AFV AC Product</u>	<u>Required Milestone Accuracy</u>	<u>MSC AC-C4 Integrator</u>	<u>ACRWG Management Board Support</u>
oo REQUIREMENTS			
Operational and Organizational Plan (C4I refinement) Umbrella, AFV Common Annexes, mission unique OPMODE Summary to include C3I	Final, as of MS I	AFV-P0 CACDA (C3I/MID)	Requirements
Required Operational Capabilities	Final, as of MS I	CACDA	Requirements
TOA, COEA (C4I requirements-technology analysis)	Final, as of MS I	CACDA	Requirements
Functional Description Lower Echelon C3I, Battalion and Below (as ATCCS supplement) Vehicle Control and Operating System (VCOS) (Defines VCOS to B2C2 information architecture)	3 Draft	CACDA CACDA CACDA	Requirements

(Note: Family guidance for O&O Plan, ROC, and CFP not detailed in this plan. Listed to ensure that when actioned, C4 is considered in detail.)

Appendix C
Work Breakdown Structure (WBS) for Concept Exploration Definition

<u>AFV AC Product</u>	<u>Required Milestone Accuracy</u>	<u>MSC AC-C4 Integrator</u>	<u>ACRWG Management Board Support</u>
oo SPECIFICATIONS			
Technical System Operational Concept (SOC) Document	3 Draft	TACOM	System Engineering (Sys Eng)
Executive Summary			Requirements.
Summary		TACOM	Sys Eng
Detailed Definition		TACOM	Sys Eng
Sys Segment Specification (SSS) System Top Level	2 Draft	CECOM	Sys Eng
oo MANAGEMENT PLANS			
AFV Automation and Communication Resource Management Plan (ACRMP)	3 Change, for MSI	AFVTF	Life Cycle Spt (LCS)
General, chapter 1		AFVTF	Exec Board
Requirements summary, chapter 2		CACDA	Requirements Brd
Program Management, chapter 3		CECOM	Exec Board
Acquisition Management, chapter 4		LOGCEN	LCS
Development Management, chapter 5		CECOM	Sys Eng
Test and Evaluation, chapter 6		CECOM	Test Planning
Plan for Support, chapter 7		CECOM	LCS
Appendices			
ACRMP Risk Management	2 Draft	CECOM	Config Mgt& Qual Assur (CM&QA)
Trade off determination and Analysis		CECOM	LCS
Technical Risk		CECOM	Sys Eng
Cost Risk		CECOM	LCS
Management Risk		CECOM	LCS
ACRMP QA Management	1 Draft	TACOM	QM & QA
ACRMP Configuration Management	2 Draft	TACOM	QM & QA

AFV Automation & Communications Work Plan

Appendix C
Work Breakdown Structure (WBS) for Concept Exploration Definition

<u>AFV AC Support Product</u>	<u>Required Milestone Accuracy</u>	<u>MSC AC-C4 Integrator</u>	<u>ACRWG Management Board Support</u>
ACRMP Supplements			Exec Board
B2C2 project management plan	2 Draft	CECOM	Sys Eng
Battalion Force Level			
Battlefield Functional Area			
VCOS Project Management Plan	3 Draft	TACOM	Sys Eng
Vehicle Common			
Mission Unique			
Automation-Communication Resource Working Group (ACRWG) Charter	2 Draft		Exec Board
CED AC Work Plan (this plan)	3 changes	AFVTF w/ AMC, TRADOC	Exec Board, Membership
SOW/RFP for Demonstration Validation (C4 portion of Family SOW/RFP)	Final for MSI		LCS Support
oo TECHNOLOGY ASSESSMENT			
TOD, BTA	Final,	CECOM/TACOM	Sys Eng
AMC Technology Base	as of MS I		
PEO/PM managed program and systems			
Industry Programs			
Foreign Sciences and Technology			
Data Collection			
(supports specification development)			
oo ARMY PLANS			
ooo TRADOC			
TRADOC Plans	1 Draft for AFV MSI	CAC, CACDA	Exec Brd, Life Cycle
Army Command and Control Master Plan			
Maneuver Functional Area			
IEW, CSS, Fire Support, Air Defense			
Army Command and Control Mission Area Development Plan			
Army Battlefield Interface Concept			
Operational Facility (OPFAC) Laydown			
Communication Data Base			
Other, to be determined			

Appendix C
Work Breakdown Structure (WBS) for Concept Exploration Definition

<u>AFV Support Product</u>	<u>Required Milestone Accuracy</u>	<u>MSC AC-C4 Integrator</u>	<u>ACRWG Management Board Support</u>
ooo AMC			
AMC Plans, to be determined			TBD
ooo PEO PLANS			
PEO/PM Plans - C3I and Vehicle			TBD
Battlefield Functional Area Command and Control Systems.	1 Draft	CECOM Lead	TBD
Battlefield Communications Systems	1 Draft	CECOM Lead	TBD
CSS Standard Multicommand Management.			
Information Systems	1 Draft	CECOM Lead	TBD
Transition to AFV	1 Draft	TACOM Lead	TBD
PEO/PM Plans - Vehicle	1 Draft	TACOM Lead	TBD
Other - to be determined			TBD

AFV Automation & Communications Work Plan

Appendix C

WORK BREAKDOWN STRUCTURE (WBS) for CONCEPT EXPLORATION DEFINITION

PART III. WORK BREAKDOWN STRUCTURE.

The following chart depicts the organization work breakdown structure or system hierarchy based on a generic vehicle organization for Concept Exploration Definition (CED). It is primarily a logical view of the user requirements.

Its purpose is to segment the VCOS (and B2C2) architecture into manageable pieces. Designated commands, in their stated roles, are to serve as subject matter experts and are responsible for developing and executing AFV support plans to achieve a Milestone I decision. User requirements and system engineering needs must be stated or clearly referenced.

The WBS is expected to be refined as the program evolves. As the concept formulation process matures a materiel or physical view WBS is expected to be created.

<u>Work Breakdown Structure</u>	<u>Combat Developer</u>	<u>Materiel Developer</u>	<u>PEO-PM Lead</u>
Communications	CACDA(C3I)	CECOM	PEO COMM
Voice	SIGCEN	CECOM	PM SINGARS
Data	SIGCEN	CECOM	PM ADDS
Security	SIGCEN	CECOM	PEO COMM
Intercom, Internal Commo	CACDA(MID)	CECOM	PEO COMM
Noise Reduction	SIGCEN	CECOM	PM SINGARS
Architecture Interface	SIGCEN	CECOM	PM SINGARS
Vehicle Defense	CACDA(MID)	TACOM	TBD
Tailored Sensor Suite	ARMSCH	CECOM	TBD
Controller	CACDA(MID)	TACOM	PM CHS
Reaction Suite	ARMSCH	TACOM	TBD
Fire Weapon Control	CACDA(MID)	ARDEC	PEO ARM
Primary Direct Fire	ARMSCH	ARDEC	PEO ARM
Secondary Direct Fire	INFSC	ARDEC	PM Small Arms
Indirect Fire	FASCH	ARDEC	PM CAWS, PM Mortar
Missile	ADASCH	MICOM	PEO CCM
Combat Service Support	LOGCEN	CECOM	PM TMDE
Diagnostics	LOGCEN	TACOM	
Prognostics	LOGCEN	TACOM	
Test Program Set	LOGCEN	CECOM	
TMDE	LOGCEN	CECOM	
LRU Replacement	ORDCEN	TACOM	

Appendix C

Work Breakdown Structure (WBS) for Concept Exploration Definition

<u>Work Breakdown Structure</u>	<u>Combat Developer</u>	<u>Materiel Developer</u>	<u>PEO- PM Lead</u>
Position and Navigation	CACDA (MID)	ETL	PEO COMM
Maneuver	ARMSCH, INFSCH, SIGCEN	ETL	PEO CCV
Fire Support	FASCH	ETL	PM CAWS
IEW	INTELSCH	ETL	PEO IEW
CSS	LOGCEN	ETL	
Air Defense	ADASCH	ETL	PEO FAAD
Embedded Training	CAC (CATA)	PMTRADE, HEL	PM TRADE
Weapon	ARMSCH	ARDEC	PM Abrams
Vehicle Operations	INFSCH	TACOM	PM Abrams
Maintenance	ORDSCH	TACOM	PM Abrams
Medical Expert System	HSC	TACOM	PEO HCS
Missions (e.g., river ops)	AFV-PO	TACOM	?
Environment Control	CACDA (MID)	CRDEC	PEO HCS
NBC Detection	CHEMSCH	CRDEC	PM NBC
NBC Protection	CHEMSCH	CRDEC	PM NBC
Fire Detection	CACDA (MID)	TACOM	PEO CCV
Fire Extinguish	CACDA (MID)	TACOM	PEO CCV
Temperature-Humidity	CACDA (MID)	CECOM, HEL	PEO CCV
Combat Lighting	CACDA (MID)	TACOM	PEO CCV
Waste Disposal	CACDA (MID)	HEL	
VCOS Controller	CACDA (MID)	TACOM	AFVTF (Role)
Processors	SIGCEN	ETDL	PEO CCS
Interfaces	CACDA (MID)	TACOM	PEO CCS
Displays	CACDA (MID)	ETDL, HEL	PEO CCV
Computer Security	INTELSCH	CECOM	AFVTF
Bus Architecture - Data Flow	CACDA (MID)	TACOM	PEO CCV
High Speed	CACDA (MID)	TACOM	
Medium Speed	CACDA (MID)	TACOM	
Low Speed	CACDA (MID)	TACOM	
Power Distribution	CACDA (MID)	TACOM	
Interconnections	CACDA (MID)	TACOM	
ATCCS	CACDA (C3I)	CECOM	PEO CCS, IEW
Components	CACDA (MID)	TACOM	
Controller	CACDA (MID)		
Graceful Degradation	CACDA (MID)		

Appendix C

Work Breakdown Structure (WBS) for Concept Exploration Definition

<u>Work Breakdown Structure</u>	<u>Combat Developer</u>	<u>Materiel Developer</u>	<u>PEO- PM Lead</u>
Power Source	CACDA(MID)	TACOM	PM MEP
Vehicle Power		TACOM	PEO CCV
Aux Pwr Unit	ENGSC		PM MEP
Alternate Storage Device		ETDL	
Tgt Acq & Recognition	CACDA(MID)	CECOM	PEO ACIS (ATR)
Acquisition	CACDA(MID)	CECOM	PEO ACIS (ATR)
Classify	CACDA(MID)	TBD	PEO ACIS (ATR)
Friend-Foe Schema	CACDA(MID)	TBD	PEO ACIS (ATR)
Recognition-Identification	CACDA(MID)	TBD	PEO ACIS (ATR)
ATCCS and B2C2 Support	CACDA(C3I)	CECOM	PEO CCS
ATCCS Interfaces	CACDA(C3I)	CECOM	PEO CCS
AFV C3I Integration	CACDA(C3I)	CECOM	PEO CCS, IEW
MVR Functional Area (FA)	CACDA(C3I)	CECOM	PM OPTADS
Fire Support FA	FASCH	CECOM	PM FATDS
ADA FA	ADASCH	MICOM	PM FAADC2
IEW FA	INTELSCH	CECOM	PM ASAS/JTF
CSS FA	LOGCEN	CECOM	PM CSSCS, PEO STAMIS
Fighting Stations	CACDA(MID)	TACOM	PEO CCV
Driver	INFSCH	TACOM	PEO CCV
Gunner	ARMSCH	ARDEC	PEO CCV
Direct Fire	INFSCH	ARDEC	PEO CCV
Indirect Fire	FASCH	ARDEC	PEO FS
Missile	ADASCH	MICOM	PEO FAAD
Vehicle Commander	CACDA(C3I)	CECOM	PEO CCS
Staff-Special Purpose	CACDA(MID)	CECOM	PEO CCS, IEW
Automotive Management	ORDCEN	TACOM	PEO CCV
External Port-Interfaces	CACDA(MID)	CECOM	PEO COMM
Vehicle to Vehicle	CACDA(MID)	CECOM	PEO CCV
Vehicle to Trn Simulator	CACDA(MID)	PM TRADE	PM TRADE
Vehicle to Commo Gateway	CACDA(C3I)	CECOM	PEO CCS, COMM
Vehicle to TMDE	CACDA(MID)	CECOM	PM TMDE
Vehicle to Unit LAN	CACDA(C3I)	CECOM	PEO COMM

Appendix C

Work Breakdown Structure (WBS) for Concept Exploration Definition

<u>Work Breakdown Structure</u>	<u>Combat Developer</u>	<u>Materiel Developer</u>	<u>PEO-PM Lead</u>
Mission Support ³	CACDA (MID)	CECOM	PM CHS
General C2 Operations	CACDA (C3I)	CECOM	PEO CCS, PM CHS
IEW Special Support	INTELSCH	CECOM	PEO IEW
MVR Special Support	CACDA (MID)	TACOM	PEO CCV
FS Special Support	FASCH		PM CAWS
Fire Dir Center (Art/Mort)	FASCH	TACOM	PEO ARM
Howitzer Operations	FASCH	TACOM	PM CAWS
Mortar Operations	INFSCN	TACOM	PM MORTAR
Missile Operations	ADASCH	MICOM	PEO FAAD
CSS Special Support	LOGCEN		
ADA Special Support	ADASCH	MICOM	PEO FAAD, PM JTF
Mobility Support	CACDA (MID)	TACOM	PEO CCV
Survivability	CACDA	TACOM, CRDEC, AMCCOM.	?
Minefield Operations	ENGSCN	BRDEC	PEO EngProgs, PM Mines
Remoted Vehicles	ARMSCH	TACOM	PM RPV/UAV
Robotic Commander Center, MDC ¹	ARMSCH, ENGSCN.	TACOM	?
Commo Master Station ²	SIGCEN	CECOM	PEO COMM
Robotic Manipulators	QMSCH	BRDEC, TACOM	?
Medical Support	HSC	?	PEO HCS
Other	TBD	TBD	TBD
OTHER, AS REQUIRED	?	?	?

Matrix Description and Key:

The first listed command has topic area lead.

Combat Developer: Designated lead for requirements development or refinement

Materiel Developer: sys engineer, supports requirements integration, and cost assistance.

PEO/PM: Lead in assisting Combat and Materiel Developers.

?: To be determined.

1: MDC is the Multi-Dimensional Concept.

2: AFV FC2V must be able to house systems such as EPLRS, MSE which require nodal or master station control.

3: Mission Support, to be developed to cover specific mission role requirements.

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APPENDIX D

MILESTONE I PRODUCT SUMMARY

This appendix has three parts. They are:

- I. Information and Assumptions
- II. Milestone I Products
- III. Summary

PART I. INFORMATION and ASSUMPTIONS.

A. Reader is familiar with the Army Tactical Command and Control System (ATCCS) and basic tenets of the Standard Army Vetrionics Architecture program. (Points of contact (POC): CECOM(AMSEL-RD-ASC0) and TACOM(AMSEL-RV)).

B. The AFV C3I Operational Definition (30 Aug 88), comprised of B2C2 and VCOS, provides a point of departure and a logical (vs physical) organization for battalion and below requirements refinement. It is envisioned that AFV C3I will supplement the Army Tactical Command and Control System (ATCCS) by capitalizing on the advantages gained by a force equipped with AFV. This definition will be expanded in the functional description (FD), technical system operational concept (SOC), and system segment specification (SSS). (POC: AMC (AMCSP-AFV), CAC AFV-P0(ATZL-CAB), AFVTF(DAMO-AFV-C))

C. MS I product described are life cycle documents which will evolve through the Demonstration-Validation Phase. All are expected to mature at varying rates, i.e. O&O Plan the highest, System Specification the lowest. However, all must be consistent with traceability back to requirements. (Reference: AR 70-1, AR 71-9, DOD-STD 2167/2167A).

D. FACT-1. TRADOC, AMC and the Information Systems Command (ISC) have formally recognized that current computer-communication resource development guidance does not provide sufficient information for embedded battlefield automation system (BAS) integration. Software technology historically has been given low priority. Resources to support fielded systems are severely constrained. Computer resource management is not universally supported. O&O Plans and ROC's in general lack adequate detail to define information system architectures. Drafts of AR 70-1, TRADOC-R 70-2, AMCR 70-16 reflect these facts. (Reference: General Officer Conference, subject: Life Cycle Software Support, 22 Jun 88, POC: TRADOC(ATCD-C), AMC(AMCDE-AT)).

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E. FACT-2. The milestone required computer resource management plan is only a plan to organize the development and refinement of C4 definition and support. It plans for computer engineering products that are required by DOD standards. Current AMC and TRADOC guidance require a computer resource management plan (CRMP), without reference to the required DOD products. (Reference: AMC-TRADOC PAM 70-2)

F. FACT-3. AFV will have embedded mission critical computer and communication resources. Examples: Fire Control, Embedded Training, Diagnostics, Communication Systems, and C2 support. (Reference the AFV O&O Plan)

G. Challenge. The combination of the above facts presents an AFV challenge. Computer integration policy and guidance is evolving. That's good. However, AFV faces a milestone decision. C4I requirements must explicitly defined. Delay in architecture definition work effort will only add to the problems identified in fact-1.

H. Resolution. Address the spectrum of C4 combat and materiel requirements early. In accordance with DA, TRADOC, AMC guidance, the AFV C4 program has been tailored to meet mission needs. The required CRMP has been expanded to include C3I requirements, hence the AFV CRMP is entitled Automation [Computer] and Communications Resource Management Plan (ACRMP). The Functional Description defines the user view of the information architecture before it built. The System Operational Concept describes a candidate hardware solution and describes soldier operations. The System Specification describes top level technical detail. The combination of the four products define the who, what, where, and why of the envisioned AFV C4 family subsystem suitable for Headquarters through action officer or engineer agreement. Accuracy levels for MS I discussed at Appendix C, part II.

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PART II. MILESTONE I PRODUCTS.

A. USER REQUIREMENTS.

Formulation and refinement of user requirements during AFV CED Phase is the priority goal. C4 functional system support and interfaces must be defined. These requirements will serve as a baseline to develop appropriate AC technical specifications and managerial support plans for a successful MS I and an aggressive Demonstration Validation phase start.

Responsible for family requirements development: TRADOC, AFV-P0

Support Agencies: AMC, AFVTF.

C4I Lead for Action: CACDA

C4I Lead Support: CAC(CATA), CACDA(MID,C3I), LOGCEN(C3I),
AFVTF(CD), CECOM, TACOM.

Work Group Support: ACRWG, Requirements Board

AC Product Interfaces: FD, SOC, SSS, ACRMP.

1) Operational and Organizational (O&O) Plan. Refine the O&O Plan to ensure C3I requirements are defined. Document C3I in a C3I annex.

2) Required Operational Capabilities (ROC). Refine O&O requirements, define interfaces to include ATCCS and establish parametric guidelines for automation and communication resources for AFV. Requirements must be documented or clearly referenced. The Functional Description will serve a ROC annex.

3) Functional Description (FD). The FD refines user O&O and ROC operational requirements suitable for [technical] System Operational [Concept] Definition and System Segment Specification creation. It defines the integrated B2C2/VCOS system information architecture and is considered an annex to the ROC and the C3I and vehicle architecture requirements definition document. Review DOD-STD-7935, and evolving AR 70-1 and TRADOC-R 71-2. The FD will have two parts:

(a) FD Executive Summary. Target Audience is senior military and civilian executives (O6 and above level).

(b) Detailed FD. Describes in sufficient detail to gain approval. FD is to be structured to enable top down review with lower levels containing more non-repetitive information. Therefore the reader may stop at the level needed to understand the system concept in user terms.

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B. SYSTEM ENGINEERING DELIVERABLES.

These products reflect AFV AC requirements that are developed in the AFV O&O Plan, ROC, and supporting FD. They provide specifications and management plans to ensure user requirements are satisfied. Reference: DOD-STD-2167/2167A.

Responsible for family C4 specifications: AMC AFV Integration Group
Support Agencies: TRADOC, AFVTF.
Vehicle Electronics Lead Action: TACOM
C4I Lead Action: CECOM
Lead Support: CACDA(MID,C3I), AFVTF(CD,MD), CECOM, TACOM.
Work Group Support: ACRWG, System Engineering Board.
AC Product Interfaces: FD, SOC, SSS, ACRMP.

1) [Technical] System Operational Concept (SOC) Definition. Serves as the technical system operations concept. Describes the AFV C3I architecture as related to Army Tactical Command and Control System (ATCCS). It's purpose is to describe the role of automation and communications within the AFV. This document directly reflects user requirements and will be updated for MS II. TACOM is the executing agency with overall SOC responsibility. The SOC will have a minimum of two parts. They are:

(a) Executive Summary. Establishes the goal for AFV C3I related analysis and work effort. Target audience O6 or equivalent and above managers.

(b) Technical System Operation Concept Description. Provides sufficient detail to describe system operations. The detailed descriptions will build on the Functional Description and be formatted similar to the FD.

2) System Segment Specification (SSS). The preliminary SSS documents technical system requirements. It differentiates between requirements which are to be accomplished by the VCOS and B2C2 automatic architectures. It represents the government top-level view on how to allocate user requirements to hardware (computer and communication) and software. Manual/automatic input, process and output is specified. CECOM is the executing agent. This document will be refined during Demonstration Validation.

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C. C4 PLANNING.

1) The planning goal is: at Milestone I the work effort described in this plan will be historical - action completed. The Automation and Communication Resource Management Plan (ACRMP) will be the plan of record to orchestrate follow on AFV C4 materiel acquisition phases.

2) This work plan focuses on the Concept Exploration Definition Phase actions.

3) Automation and Communication Resource Management Plan (ACRMP). The Task Force umbrella plan for AC life cycle requirement and resource development management. The ACRMP contains seven chapters: General (introduction), Requirements Summary, Program Responsibilities (TRADOC, AMC, PEO, ACRWG), Acquisition Strategy, Test & Evaluation, Development Management, and Post Deployment Support.

Responsible for ACRMP: AFVTF

Support Agencies: TRADOC, AMC.

Lead Support: CECOM, TACOM, CACDA, ARDEC, CRDEC, MICOM.

Work Group Support: ACRWG, Life Cycle Support Board.

AC Product Interfaces: FD, SOC, SSS, AFV Family Products-Plans.

The ACRMP will be refined in the areas of:

(a) Requirements Integration. Anticipate requirement changes or updates. Document C3I plan to facilitate requirement refinements in a disciplined manner. Action: CACDA. ACRWG support: Requirements Board.

(b) Quality Assurance Management. Quality Assurance and Management will be used to describe the organizations and procedures for evaluating government or contractor originated documentation, hardware (computers & communications) and software to ensure AFV product consistency. Action: TACOM, ACRWG support provided by the Configuration Management & Quality Assurance (CM & QA) Board.

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(c) Configuration Management (CM). CM will cover documentation, hardware (automation and communications) and software configuration management practices that are directly applicable to AFV computer, communication, and electronics resources. This portion supplements the AFV Configuration Management Plan. Action: TACOM, with ACRWG CM & QA Board support.

(d) Technical Risk Management. Identify the areas of risk or concern which requires further analysis and review. Risk Management strives for risk reduction on the AC and C4I requirements and technologies. Cost, schedule, technology, management and funding risks will be addressed. As required, these areas are feed into the Concept Formulation Process for analysis. Action: CECOM, with ACRWG System Engineering and Life Cycle Support & Planning Board support.

(e) System Engineering. System engineering principles described in the ACRMP must be reviewed and refined in the command, control, communications, computer (includes artificial intelligence and robotics), and vehicle electronics technology areas. Action: CECOM, with ACRWG System Engineering Board Support.

PART III. SUMMARY

Part I provided the basic rationale for the C4 product requirements. Part II defined the products. These products collectively define the architecture. For Milestone I these products will be captured at a predetermined time for decision board review; however each will continue to evolve through and beyond Milestone II.

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APPENDIX E
MILESTONE I SUPPORT

This appendix has five parts:

- I. Introduction.
- II. C4 Direct Support Products.
- III. Support Products.
- IV. DA-MACOM Plans.
- V. Summary.

PART I. INTRODUCTION.

A. This appendix describes the multitude of direct or indirect (non-C4 pure) work efforts that affect AFV C4. Heretofore, special areas such as logistics, cost, testing, human factors, or training have tackled the AFV challenge from a special interest point of view. Each area addresses C4 to varying degrees. For example: LSA task 202 deals to hardware-software analysis, embedded training needs computer resources, family level cost estimates roughly estimate computer resource dollars, the soldier machine interface is through the fighting station, and computer resource testing is part of the AFV system test plans.

B. Each specialty area has a place within the materiel acquisition process (MAP) and each will address the AFV family perspective. By design, none have been tailored to specifically address technical and functional complexities of C4. All MAP areas must be consistent. This annex describes the interrelationships with the other AFV products.

PART II. C4 DIRECT SUPPORT PRODUCTS.

The products below as a results of supporting analyses have direct applicability to C4 developments. They are listed to ensure C4 is considered early and throughout their development.

A. Automation-Communications Requirements and Engineering Management Plans. The complexity of dictates special area focus and precise management. Project Management Plans (PMP) for VCOS and B2C2 are to produced to plan for their implementation. Although one command has action, each PMP will reflect a multiple command work effort. As the PMP's evolve risk factors (technical, managerial, and cost) are envisioned to be reduced. The following engineering plans are annexes to the ACRMP.

1) Vehicle Control and Operating System (VCOS) PMP. Orchestrates the integration of VCOS architecture components within AFV. It describes the organizations, procedures, B2C2 Interoperability, and tasks or activities required to develop VCOS hardware and software. Action: TACOM.

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2) Battalion and Below Command and Control (B2C2) PMP. Technical integration plan to develop common C3I system support for AFV. It describes the organizations, procedures, VCOS Interoperability, and tasks or activities required to develop B2C2 hardware and software. Action: CECOM.

B. Concept Formulation Package (TOD, TOA, BTA, COEA). Analysis to complete the CFP is cyclic. Evolving results are applied to AFV products. In turn the application is evaluated until a satisfactory solution is reached.

Lead Agency: AMC, TRADOC

Lead Support Agencies: AFVTF, TRADOC, TACOM, CECOM

Work Group Support: ACRWG

AC Document Interfaces: ACRMP, FD, SOC, SSS

1) Automation and Communication (AC) Technology Assessment. This is an annex to the AFV family Technology Assessment or TOD and evolving BTA. The AC portion is emphasized here. The AFV AC Technology Assessment covers Army Tech Base, PEO/PM systems, foreign science, and NDI systems or components. A coordinated work breakdown structure will be used. This work effort is listed here to ensure C4I is addressed and to identify the need to plan for technology insertion.

2) Trade Off Analysis. Along with the TOD, preliminary results may be utilized to development the C4 Functional Description (FD), and technical System Operational Concept (SOC).

3) Best Technical Approach. The on going BTA analysis is expected to provide supporting information to the FD, SOC, and System Segment Specification (SSS) developers.

4) Cost Operational Effectiveness Analysis (COEA). Evolving COEA results in the C3I-vehicle control and C4I materiel requirements are applied to AFV C4 products.

C. Statement of Work (SOW) and Request for Proposal (RFP). The automation and communication AC C4I AFV Contractor Demonstration Validation Phase efforts must be documented by the conclusion of Concept Exploration Definition. Work effort toward this goal must support overall AFV SOW/RFP efforts. Provide ACRMP input to recommend management guides to capture prototype or demonstration data for full scale development.

Lead Agency: AMC (TACOM)

Lead Support Agencies: AMC, TRADOC, CECOM, TACOM, CRDEC, MICOM,
ETL, PM TRADE, HEL.

Work Group Support: ACRWG, Life Cycle Support & Plans.

AC Document Interfaces: ACRMP

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D. Test Planning. The AFV Test and Evaluation Master Plan (TEMP) is to provide the family test plan. Computer (and if necessary communication) resource testing at the family level is to be covered; however, due to the scope of the family all levels of testing may not be covered. Therefore, the ACRMP will refine test requirements for AFV AC-C4, while maintaining compatibility with the TEMP.

Lead Agency: AMC (TACOM, CECOM)

Lead Support Agencies: AMC, TRADOC, CAC, CECOM, TACOM, MICOM, ARDEC, CRDEC, ETL, PM TRADE, HEL.

Work Group Support: ACRWG, Test Planning Board

AC Document Interfaces: ACRMP

E. Hardware-Software Cost Data Refinement. Cost data has and will continue be collected at the vehicle and family levels. Refinement for hardware (computer & communication) and software is required to capture accurate estimates of development, operational, and supportability (maintenance) costs.

Lead Agency: AMC (CECOM)

Lead Support Agencies: AMC, TRADOC, CAC, CECOM, TACOM, MICOM, CRDEC, ETL, PM TRADE, HEL.

Work Group Support: ACRWG, Life Cycle Support & Planning Board.

AC Document Interfaces: ACRMP

F. Logistics Integration. The ILSP is the family approach to logistics integration and covers the total spectrum development and post deployment support. The ACRMP focuses on the specifics of computer, communication, and electronics (CCE) to ensure sufficient guidance is provided. ILSP and ACRMP consistency is required.

Lead Agency: TRADOC (LOGCEN)

Lead Support Agencies: AMC, TRADOC.

Work Group Support: ACRWG, Life Cycle Support & Planning Board.

AC Document Interfaces: ACRMP

G. Human Factors Analysis. The VCOS fighting station is the single soldier machine interface. Combat and materiel (software-hardware) requirements analysis is to be conducted.

Lead Agency: AMC (HEL)

Lead Support Agencies: AMC, TRADOC, PM TRADE

Work Group Support: ACRWG, System Engineering & Plans Board.

AC Document Interfaces: ACRMP

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H. Training. The training development community, as guided by the AFV STRAP, is expected to define those functions to be allocated to vehicle organic embedded training. The ACRMP defines the development (or technical) approach. The C4 (B2C2 and VCOS) functional description will define the embedded training information architecture.

Lead Agency: AMC (PM TRADE)

Lead Support Agencies: AMC, TRADOC, CAC

Work Group Support: ACRWG, Life Cycle Support & Planning Board.

AC Document Interfaces: ACRMP

I. Other products affect C4 products. Recommendations to improve this appendix requested.

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PART III. SUPPORT PRODUCTS.

The documents below directly affect or impact AC developments but are not directly controlled by AC-C4 combat and materiel developers. All must be integrated to consider AC related requirements. Each are covered in separate work plans or directives. Organizations responsible for analytical effort in the product areas are responsible for providing information and maintaining coordination with AFV AC developers. (Selected products listed at part two, this appendix, are repeated here for emphasis.)

A. Requirements Documentation. As stated the O&O Plan and ROC directly affect C4I integration efforts.

B. System Training Plan (STRAP). Covers the total management spectrum of training. ACRMP manages the technical implementation of embedded training. STRAP primary document for Army organization and functional requirement development. STRAP guides the user community toward identifying the tasks and goals of AFV embedded training.

C. Test and Evaluation Master Plan (TEMP). Covers AFV subject matter system planning. ACRMP covers AC test and evaluation (TE) and is a separately published annex to the TEMP. The Test Integration Work Group (TIWG) supports AFV system TE and will consist of members literate in AC testing.

D. System Manpower Management Plan (SMMP). Orchestrates Army human factor engineering (HFE) effort for AFV and will provide technical data (Soldier Machine Interface (SMI), HFE, QOPRI, Safety) to ACRWG for AC development technical consideration. SMI information sharing is essential. Human factors engineering will be considered throughout AFV life cycle.

E. Baseline Cost Estimate (BCE). Develops cost data for AFV. It will cover AC costs. Costing effort includes ATCCS hardware and software as related to AFV utilization and developments.

F. Concept Formulation Package (CFP). This process leads to the development of the TOD, TOA, BTA, and COEA documents based on modeling and analytical support. AC requirements and areas of or at risk will be considered. AC requirements must be considered during CFP and in resulting documents.

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G. Integrated Logistics Support Plan (ILSP). ILSP reflects the AFV acquisition strategy, contractor support (to include vehicle drawings, best technical approach, Manprint, survivability, integrated logistics (LSA, testability, and management), producibility, and systems engineering) and computer-communication resource support requirements. The ILSP is the capstone logistics document. The ACRMP is considered an annex to specify specific computer and communication needs.

H. Systems Threat Assessment Report (STAR). The STAR will be developed IAW the Threat Support Plan (TSP). AC development must consider threat strengths in AC and C3I and be able to exploit threat weakness.

I. System Concept Paper (SCP). Summarizes the overall AFV system concept. The SCP contains a C3 paragraph.

J. AFV Operational Concept. This concept develops AirLand Battle Future (ALB-F). Advanced C3I needs identified.

K. Transition Plan (TP). The TP is the plan to move the Army toward AFV. It will include (state or reference) ATCCS as now planned to ATCCS with lower echelon C3I.

L. Materiel Fielding Plan. Battalion set fielding is envisioned, utilization and implementation of C4 resources are to be addressed.

M. Production Readiness Report. Must include the readiness or availability of hardware-software life cycle support. Post deployment support is a required topic in the ACRMP and includes development environments (to include emulators), programming languages, maintenance, engineering change proposals, and the requirement for field operated hardware-software at the life cycle support facility.

N. Configuration Management Plan (CMP). The family oriented CMP must be compatible with the guidelines set forth in the ACRMP.

O. Other, as plans mature.

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PART IV. DA-MACOM PLANS.

A. Introduction. AFV C4 initiatives impact a myriad of non-AFV pure plans. These plans are expected to be reviewed and draft updates ready for publication at milestone I.

B. TRADOC HQ AC Plans and Actions. Master plans are to be refined to incorporate the characteristics of AFV systems horizontally and vertically among the five battlefield mission areas to achieve integration of requirements. Draft changes to the plans listed below are expected to be ready by MS I.

1) C2 Master Plan (AC2MP). Update and refine to incorporate lower echelon Command and Control (C2) as reflected in AFV C3I concepts.

2) C2 Mission Area Development Plan. Update and refine to incorporate AFV plans.

3) Army Battlefield Interface Concept (ABIC). Expand plan below battalion levels.

4) Operational Facility (OPFAC) Laydown. Update and refine according to AFV plans.

5) Communication Database. Update and refine according to AFV plans.

6) Other Requirements. Review and consolidate mission needs, O&O, ROC, plans, and events for AFV applicability and integration.

7) Policy, Plans and Activities. Notify the AFVTF AFV Proponency Office (ATZL-CAB) and AMC (AMCSP-AFV) upon initiation of plans, procedures, work or study groups creation, or regulatory guidance changes that may impact AC developments.

8) Affected Battlefield Functional Areas (BFA): Maneuver (MVR), Fire Support (FS), Air Defense (AD), Combat Service Support (CSS), and Intelligence & Electronic Warfare (IEW).

9) Other, TBD.

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C. AMC AC-C4 Plans.

1) Technology Integration. Tailor AFV AC applicable Army Technology Base, Program Managed systems, foreign science, and industry programs toward AFV developments. Collect technical, demonstration, P3I, and milestone data. Identify dollar or technology constraints which may impact AFV.

Lead Agency: AMC.

Support Agency: TRADOC, other TBD.

Work Group Support: ACRWG.

AC document interfaces: ACRMP, SOD, TA (AC annex).

2) Mission Area Materiel Plan (MAMP). Cross walk MAMP to AFV requirements. All mission areas must be considered.

3) Policy, Plans and Activities. Notify AFVTF, AFV Proponency Office (ATZL-CAB) and AMC (AMCSP-AFV) upon initiation of plans, work or study group creation, procedures or regulations which may impact AC-C4 developments.

D. PEO Plans. Refine plans to anticipate AFV requirements.

1) Communication Systems. Plan for VCOS and B2C2 integration.

2) Functional C2 Systems. Plan for VCOS and B2C2 integration.

3) Policy, Plans and Activities. Notify AFVTF, AFV Proponency Office (ATZL-CAB) and AMC (AMCSP-AFV) upon initiation of plans, work or study group creation, procedures or regulations which may impact AC-C4 developments.

D. SARD Plans.

1) Long Range Resource Development and Acquisition Plan (LRRDAP). Cross reference LRRDAP to AFV requirements. Consider all mission areas and AFV mission roles. Coordination with ODCSOPS (DAMO) is expected.

2) Policy, Plans and Activities. Notify AFVTF, AFV Proponency Office (ATZL-CAB) and AMC (AMCSP-AFV) upon initiation of plans, work or study group creation, procedures or regulations which may impact AC-C4 developments.

3) Other. PEO and DARPA coordination to determine applicable effort for AFV development, fielding, and P3I.

E. HQ DA Staff - All. Notify AFVTF, AFV Proponency Office (ATZL-CAB) and AMC (AMCSP-AFV) upon initiation of plans, work or study group creation, procedures or regulations which may impact AC-C4 developments.

F. Other to be determined.

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PART V. SUMMARY

The goal of CED is to define AFV in sufficient detail for a milestone decision. The Army materiel acquisition process (MAP) supports this effort. Unfortunately, the the dynamics of MAP have been defined for single systems and only recently updated for families of system of similar class, e.g. Common Hardware Software under PEO CCS.

AFV is more than lethality and horse power. It contains a subordinate class (or family) of AC-C4 requirements and evolving materiel solutions. This class must be addressed.

APPENDIX F

TOTAL ARMY SUPPORT

This appendix has three parts:

- I. Introduction.
- II. Army AFV Support.
- III. Special Army Support.

PART I. INTRODUCTION.

The total magnitude of AC-C4 work effort within the Army is almost incomprehensible. However, it is the magnitude that is most promising for AFV. It shows that the goals of AFV C4I are possible if planned, controlled, and orchestrated.

Part II demonstrates that Army support exists for the AFV C4I program. Part III depicts other work effort that is not normally associated with the AFV C4 project. AFV C4 is not expected to increase their respective work loads but utilize evolving results to an AFV advantage. The pieces of an advanced C3I architecture are for the most part in place. As a start the players must be notified of their role and potential application to AFV.

PART II. ARMY AFV SUPPORT.

AFV support for C3I-C4I initiatives is defined in by the Automation and Communication Resource Working Group, via its' approved charter. The work organization was summary at paragraph 4C, Work Organization. ACRWG membership follows:

- A. Convening and Approval Authority: Director, AFVTF.
- B. ACRWG Chair: Deputy Director, AFVTF
- C. DA Advisory Panel: DA Staff (ODCSOPS, ODCSLOG, ODISC4, ASA(RDA)), PEO CCS, PEO COMM, PEO IEW, AMC HQ, TRADOC HQ, and AVSCOM. May serve as senior advisors to the ACRWG boards listed below.
- D. ACRWG Sitting Chair: AFVTF, Project Officer C3I
- E. ACRWG Executive Board. Sitting Chair: AFVTF. Members: AMC Integration Group, AFV Propensity Office, LOGCEN, SIGCEN, TACOM, CECOM. Associate members: TBD. The subordinate management boards are:

(1) Requirements Development. Sitting Chair: CACDA. Members: INFSCH, ARMSCH, FASCH, ADASCH, SIGCEN, INTELSC, ORDCEN, CHEMSCH, CHAPLAIN (honorary, for risk reduction). Associate Members: PEO- ACIS, CCV, IEW, COMM, CCS, Engineering Topographic Lab (ETL), and PM TMDE.

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(2) System Engineering. Sitting Chair: TACOM. Deputy: CECOM. Members: ARDEC, MICOM, CRDEC, HEL, PM TRADE, ETL, CACDA, NRDEC. Associate members: PEO - FAAD, FS, ARM.

(3) Life Cycle Support and Plans. Sitting Chair: CECOM. Members: ARDEC, MICOM, ETDL, LABCOM, TACOM, LOGCEN, CACDA. Associate members: TBD. Advisory member: LEA.

(4) Test Planning. Sitting Chair: TACOM. Deputy: CECOM. Members: CAC, ORDCEN, LOGCEN. Associate members: TEXCOM, PEO- CCS, COMM, PEO IEW, and PM TMDE. Associate members: PEO- ACIS, CCV, IEW, COMM, CCS, and PM TMDE. Advisor: OTEA, TECOM.

(5) Quality Assurance and Configuration Management. Sitting Chair: TACOM. Members: To be determined from WBS designees.

E. AFV ACRWG participation is expected to expand or contract as mission requires.

PART III. SPECIAL ARMY SUPPORT.

Other Work Group (WG) or Committees. The following WG's are anticipated to participate in AC-C4 developments. Task Force participation is expected in each.

A. AFV Work Groups. The following WG's may be utilized during CED: Maneuver, Logistics, Manprint, Threat, Standardization & Interoperability, Cost, Training, and Test. Each work group has a special area focus. Each are required to consider C4 developments and initiatives. The AFV ACRWG charter describes relationships with these work groups in more detail. Membership-participation: Army wide. Leadership is provided by: AFVTF, AMC(AMCSP-AFV), and TRADOC AFV-PO(ATZL-CAB).

B. Standard Army Vetrronics Architecture (SAVA). SAVA is expected to guide Vetrronics definition for the Army and will coordinate with the Tri-Service Joint Integrated Avionics Working Group. Avionic specifications and devices will be considered. Status: Inactive, TACOM, LABCOM only.

C. Robotics Tech Base Group (RTBG). RTBG focuses the Army Tech Base for robotics efforts and identifies candidate technologies or projects for AFV. It will also support general AFV Technology Assessment efforts and reviews the ACRMP to ensure management guidelines are established. Army chair: Human Engineering Laboratory. Membership-participation: Army wide, a joint AMC-TRADOC work group.

D. Artificial Intelligence Tech Base Group (AITBG). AITBG focuses Tech Base for AI efforts and identifies candidate technologies or projects for AFV. It will also support general AFV Technology Assessment efforts and reviews the

Appendix F
Total Army Support

ACRMP to ensure management guidelines are established. Army chair: LABCOM, Harry Diamond Laboratory. Membership-participation: Army wide, a joint AMC-TRADOC work group.

E. Artificial Intelligence (AI) Centers of Excellence. Under the direction of the HQ DA AI Management Center, multiple MACOM-MSO's have established centers to apply [computer science] AI technology. These knowledge engineering centers have been established at LOGCEN, SIGCEN, TRADOC HQ, TECOM, CAC, ISEC, and INTELSEN. It is envisioned that tactical or command and control decision support tools may become available for mission, enemy, troops, terrain, and time analyses (METT-T).

E. AirLand Battle (ALB-F) Future Study Group. Located at the Combined Arms Center, the ALB-F group is refining the ALB-F concept and doctrine. As the C3I piece matures its' effect on the AFV O&O Plan, ROC, and FD will be analyzed for impact.

F. Armor Anti-Armor (A3) Study Group. Impact on C3, is to be determined. However, it is anticipated that the combination of ALB-F, AFV force requirement, and the A3 will produce a comprehensive plan for heavy force modernization that direct affects on the C4 mission area.

G. Position-Navigation Developments. Engineering Topographic Laboratory (ETL) has been designated the Army lead in collecting combat requirements for position/navigation support. ETL is working with the Defense Mapping Agency to develop map data support and standards for tactical use.

H. Maneuver Control System (MCS) Improvements. The maneuver battlefield function area (BFA) TRADOC schools are updating the MCS requirements documents for battalion and below support. The resulting functional requirements are to be applied to AFV and expanded to all BFA's. CACDA-C3I has the integration lead. Current participants are: INFSCH, ARMSCH, SIGCEN, ENGSCH, AVIACEN, CHEMSCH, and MPSCH.

I. ATCCS System Engineering and Standards. This is a cooperative effort by primarily CACDA, CECOM, PEO CCS, PEO COMM, and PEO IEW to integrate the Army Tactical Command and Control Systems (ATCCS). The subset of the evolving standards are applicable to AFV B2C2 initiatives, but these standards must not technically overburden lower echelon C2 systems.

J. ATCCS Systems. The basic tenets of Army command and control system have been established ATCCS. MCS, FAADC2I, AFATDS, CSSCS, ASAS provide functional mission area C2 support. Communications are supported by SINCGARS, JTIDS, EPLRS, and MSE. Each support lower echelon command and control to varying degrees; however, none provide a common battalion and below force level control system. Today's ATCCS plans support ALB. A combined AFV-ATCCS supports ALB-F. The players in the ATCCS developments are: CACDA, TRADOC schools (para H, above), FASCH, ADASCH, INTELSEN, LOGCEN, PEO CCS, PEO COMM, PEO IEW, PM JTF, PM TMDE, ETL, CECOM, and MICOM.

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K. Army Materiel Technology Base. A myriad of initiatives exist covering the entire spectrum of computer-communication science technologies. For example: CECOM is supporting communication system improvements and is assisting in lower echelon C2 developments. The TACOM combat vehicle command and control (CVCC) program ties their Vetronics program together for the M1-M2 fleet. TACOM-HEL have technology demonstrator programs. ARDEC has a program to support C2 and capitalize on current vehicle space-weight constraints via the utilization of advanced (smaller-powerful) computer chip technology. These technology base programs can form the AFV CSI cornerstone.

L. Current Fleet Block Improvements. The Standardized Integrated Command Post System (SICPS) plan to improve the M577 and provide an internal ATCCS component architecture. Planned M1 block improvements consider vehicle information dissemination support, Position-Navigation support, improved fire control, and other AFV like characteristics. These are part of the AFV building blocks. Participants in these developments are: CACDA, TACOM, CECOM, NRDEC, PEO CCV, PEO CCS, PEO COMM, ARMSCH and INFSC.

M. Combat Vehicle Command and Control System. Although currently oriented toward the M1-M2 fleet, the German (NATO) interoperability aspects of the program may be applied to AFV. ASARDA, TACOM, CECOM, ARDEC along with the Germans are pursuing joint lower echelon command and control.

N. Other, TBD.

(Changes or updates to this annex are expected.)

APPENDIX G
REFERENCES and BACKGROUND

REFERENCES

ABIC	Army Battlefield Interface Concept
AC2MP	Army C2 Master Plan
AR 70-1	Research, Development, and Acquisition
AR 71-9	Materiel Requirements
AFV ACRMP	AFV Automation and Communication Resource Management Plan, w/ change 1, Jan 88.
AMC-TRADOC Pam 70-2	Materiel Acquisition Handbook, 1987.
C2MADP	C2 Mission Area Development Plan (Draft)
C3I Definition, AFV	ACRWG Session Results, April 88
AMC-R (DARCOM) 70-16	Management of Computer Resources in Battlefield Automated Systems
DA PAM 11-25	Draft, Life Cycle System Management Model (LCSMM) for Army Systems
DODD 5000.29	Management of Computer Resources in Major Defense Systems
DOD-STD-2167	Defense System Software Development
DOD-STD-7935	Functional Description
O&O Plan	Approved O&O Plan of AFV, CARDS No. 01003P
ROC	Draft, Required Operational Capabilities
TRADOC-R 71-2	Life Cycle Software Support (LCSS) Program, Draft

(Additional references listed in the preliminary AFV ACRMP)

AFV Automation & Communications Work Plan

Appendix G
References and Background

AUTHORIZATION

A. Charter for the Department of the Army, Armored Family of Vehicles Task Force, DAMO-FDD, 17 Feb 86.

B. Automation and Communication Resource Management Plan (ACRMP), DAMO-AFV-C, Change 1, Jan 88, Vol XV (U), (DTIC AD Number: A190 934, formerly known as the Computer Resource Management Plan (CRMP)).

GUIDANCE

C. Message, AFVTF, DAMO-AFV-C, subject: Armored Family of Vehicles Lower Echelon C3I Requirements, 211200 Apr 88Z.

This message established development approach policy: 1) Analysis and definition of C3I concepts and requirements at battalion and below levels occurs for all battlefield function areas, 2) Build on the Army Tactical Command and Control System (ATCCS), 3) Determine candidate functions for integrated automation and communications, 4) Explicitly state or clearly reference C3I requirements in AFV requirements and planning documents, and 5) Synchronize C3I developments.

D. Memorandum, AFVTF, DAMO-AFV-C, subject: Results of the Armored Family of Vehicles Automation and Communication Resource Working Group (ACRWG) C3I and Vehicle Architecture Planning Session, 16 May 88.

This memorandum provided the initial ACRWG approved C3I Architecture Definition (B2C2-VCOS) to assist the Concept Formulation Process and requirements refinement efforts. ACRWG approval based on CAC(AFV-P0), CACDA, ARMSCH, INFSCH, ADASCH, FASCH, LOGCEN, and INTELSCHE review and support. Also provided a draft of this work plan and established the need for a preliminary System Requirements Review prior to MS 1.

E. Meeting, Subject: Life Cycle Software Support, General Officer session, 22 Jun 88, Ft Monroe, VA. (Attended by: TRADOC DCD, CDR ISEC, PEO CCS, AMC(AMCDE-AT), TRADOC(C4)).

This meeting resulted in the recognition that software development support and emphasis is lacking. Corrective action prescribed - update AR 70-1 & TRADOC-R 71-2).

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References and Background

Background-Summary

AC Product Summary Rationale and Reference

Product	Rationale	Reference
O&O Plan Revisions ³	Requires improved C4I definition.	AR 70-1, 71-9
ROC Refinements	VCOS/B2C2 not fully defined or referenced.	AR 70-1, 71-9
Functional Description	O&O and ROC Refinement	DOD-STD 7935
ACRMP	Manage AFV AC life cycle.	AR 71-9 DODD 5000.29
VCOS PMP (technical)	VCOS architecture development and management.	ACRWG ²
B2C2 PM (technical)	B2C2 architecture development and management.	ACRWG ²
SOC (technical)	AFV C3I Definition, B2C2 & VCOS, expands AFV System Opn Concept.	DOD-STD 2167 ¹
SSS	Top Level spec for ROC, includes VCOS and B2C2.	DOD-STD 2167 DOD-STD 490A ¹
Tech Assessment	Feasibility, Cost, Data collect.	AR 70-1, 71-9
SOW/RFP for Dem. Val.	Plan next phase.	
Other ³	To be determined.	

Key:

- 1: Tailored requirements for AFV. Product definition based on Data Item Descriptions however, definition modified to integrate automation and communication developments.
- 2: ACRWG held Sep 87, determined B2C2 and VCOS PMP be developed as separate plans to the scope and complexity of each.
- 3: Other AFV documents exist which impact AC-C4 developments.

AFV Automation & Communications Work Plan

APPENDIX H
ACRONYMS and DEFINITIONS

Acronyms

AC	Automation and Communications (C3,C4)
ACRWG	AC Resource [Development] Working Group
ACRMP	AC Resource Management Plan
AC-C4	Total (combat-materiel) integration of C4I.
AFV	Armored Family of Vehicles
AFVTF	AFV Task Force
AFV C3I	AFV advanced concept based on new armored family
ALB-F	AirLand Battle- Future
ATCCS	Army Tactical C2 System
BTA	Best Technical Approach
B2C2	Battalion and Below Command and Control System
C2	Command and Control
C3	C2 and Communications
C4	C3 and Computers
C4I	C4 and Intelligence
CED	Concept Exploration Definition Phase
CCE	Computer, Communication, Electronics
COEA	Cost and Operational Analysis
FD	Functional Description
ILSP	Integrated Logistics Support Plan
LAN	Local Area Network
LSA	Logistics Support Analysis
MAP	Materiel Acquisition Process
MS I	Milestone One of the Materiel Acquisition Cycle
NDI	Non-Developmental Item
O&O	Operational and Organizational Plan
PEO	Program Executive Officer
P3I	Preplanned Product Improvement
PMP	Program Management Plan
QQPRI	Qual., Quant., Personnel, Reqts, Integration.
ROC	Required Operational Capability
RFP	Request for Proposal
SCP	System Concept Paper
SOC	Technical System Operational Concept for AC-C4
SOW	Statement of Work
SMI	Soldier Machine Interface
SRR	System Requirements Review
STAR	Systems Threat Assessment Report
SSS	System Segment Specification (or System Spec.)
TA	Technology Assessment
TEMP	Test and Evaluation Master Plan
TF	AFV Task Force
TIWG	Test Integration Work Group
TOA	Trade Off Analysis
TOD	Trade Off Determination
VCOS	Vehicle Control and Operating System

APPENDIX H
ACRONYMS and DEFINITIONS

Definitions or Terms of Reference

AFV Automation and Communication: Summarizes the spectrum of AFV C2 through C4I developments.

Computer Resources: All AFV embedded automated systems fall into this category. Computer resources include:

- 1) Software. Covers all AFV programming methods, tools, firmware, support environments, and languages utilized. It includes artificial intelligence, applications programming, data base, graphics, robotic control, and system level software.

- 2) Hardware. Covers all computer hardware, and physical interconnections, electronic interfaces, and associated peripherals which affects information flow.

Communication Resources: Covers internal and external communications requirements for AFV and includes interface standards and protocols. Communication resources include:

- 1) Voice Communications. Covers internal and external vehicle or crew and C2 and intelligence communications.

- 2) Data Communications. Covers C3I, internal and external data communications.

- 3) Communications Security. Covers all aspects of communication security to include operations and technical portions.

Product: Equivalent to the term deliverable. Initially a first cut draft, updated with staffed interim refinements, reviewed at the preliminary System Requirements Review, captured as final for MS 1, and updated through and beyond MS 11.

APPENDIX I
ORGANIZATION DYNAMICS

This appendix has four charts to summarize the dynamics associated with AFV C4 coordination and C4 product development.

First Chart, C4 Work Organization. Depicts the management, Lead integrator, product developer, work breakdown structure (WBS) expert, and Army support static hierarchy.

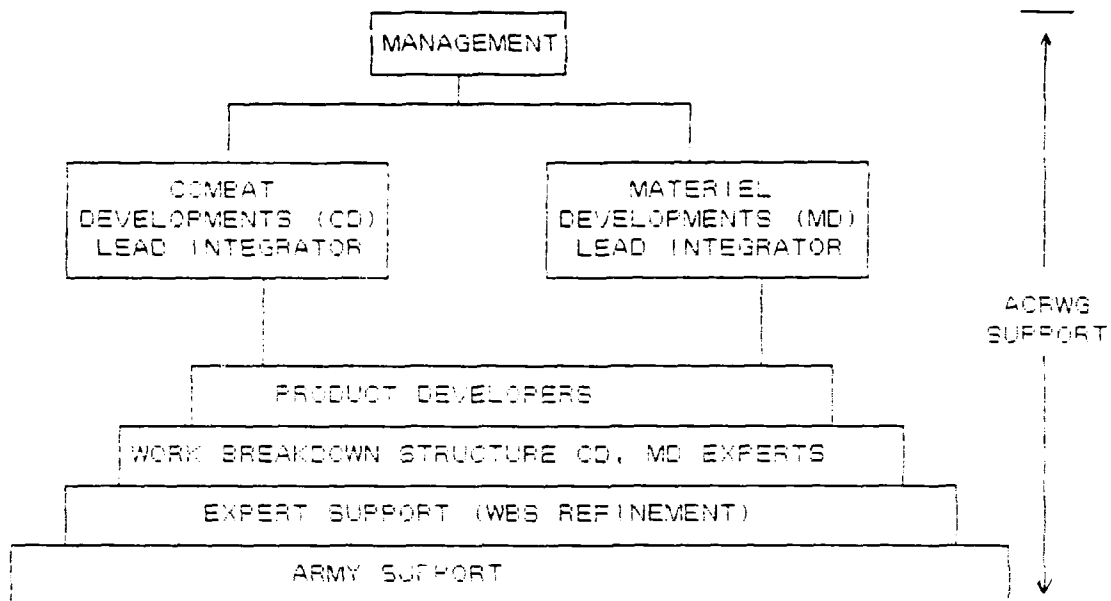
Second Chart, Automation-Communication Resource Working Group (ACRWG) Support Team. This chart expands the first by depicting ACRWG management support for the C4 work organization. Dynamic relationships are not shown.

Third Chart, Coordination Dynamics. This chart shows the relationships for coordination between management, lead integrators, product developers, WBS experts and ACRWG Boards.

(Chart syntax: --input description-->|organization|--output description-->)
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+-----+

Fourth Chart, Production-Process Dynamics. Depicts the relationship between the family production and the C4 special products (ACRMP, FD & Specifications, Technical Support Plans, Quality Assurance, and the this CED ACWP). This chart coupled with the Coordination Dynamics chart shown the organizational dynamics of the AFV C4 program.

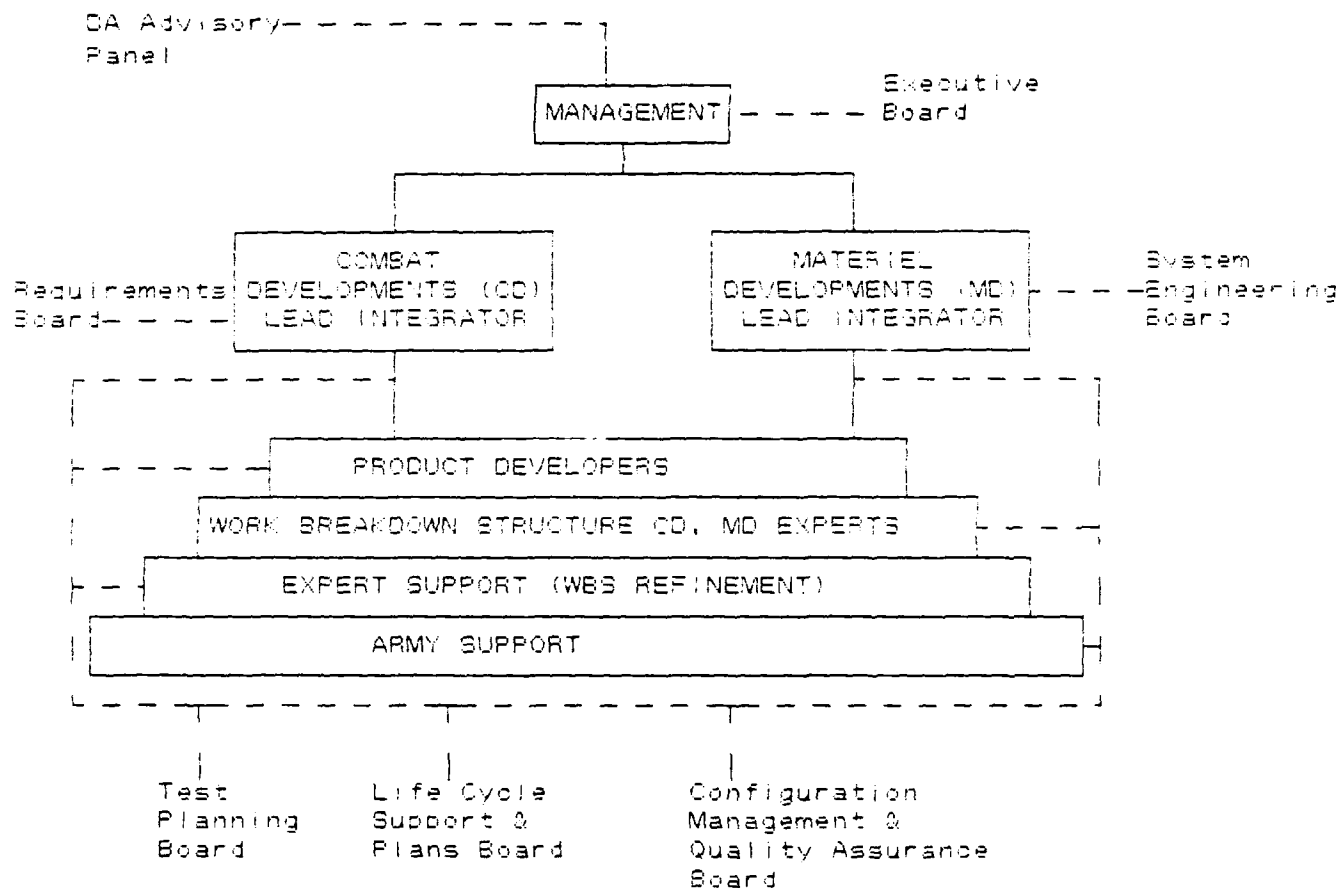
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ORGANIZATIONAL DYNAMICS



C4 WORK ORGANIZATION

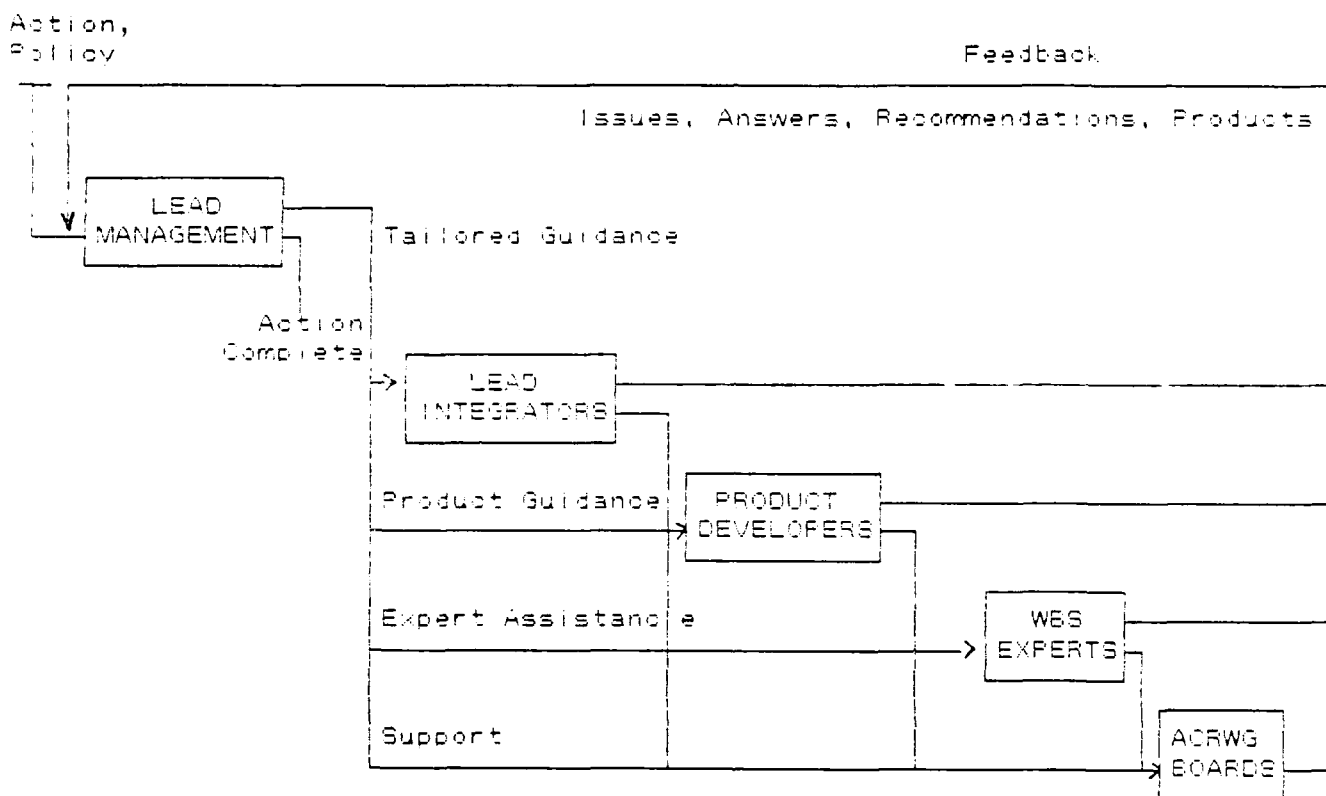
APPENDIX I

ORGANIZATIONAL DYNAMICS



ACRWG SUPPORT TEAM

ORGANIZATIONAL DYNAMICS



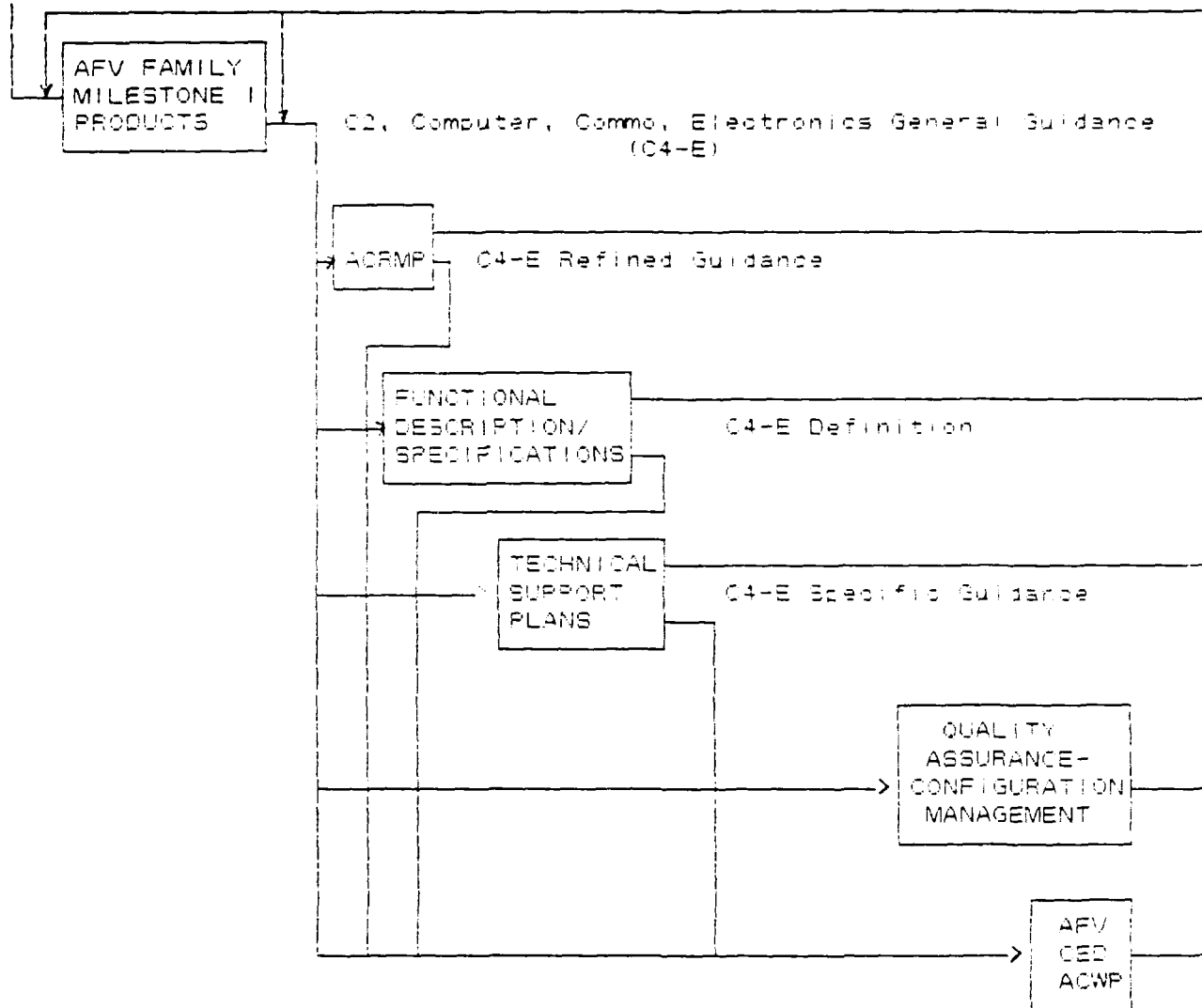
COORDINATION DYNAMICS

APPENDIX I

ORGANIZATIONAL DYNAMICS

FAMILY
GUIDANCE, REQUIREMENTS

FEEDBACK



PRODUCT-PROCESS DYNAMICS

The ACWP plan will continue to evolve throughout the AFV CED as a supplement to ACRMP. The work plan as formulated describes what must be accomplished for a Milestone I decision. The next step is to refine this plan in order to accomplish these objectives. Recommended changes and comments are encouraged. Contact point of contact (POC) below and mail recommended changed to Director, AFVTF (ACRWG), ATTN: DAMO-AFV-M, Fort Eustis, VA 23602-5597.

TRADOC POC's are Major Jones, AFV-PO (ATZL-CAB), Av 552-3715, or Mr. Dudley, CACDA (C3I, ATZL-CAC), Av 552-4786. AMC POC's are Cpt Mingilton (AFV Integration Group, AMCSP-AFV), Av 284-1966, or Mr. Butler (C3I, AMCDE-C), Av 284-9563. Task Force POC's are Major Buckstad or Major Wooster (DAMO-AFV-C), Av 927-1465/66.
